Notebook Series -- Notebooks by Experimenters Other Than Edison
Chemical Experiments -- L. F. Ott Books
Notebook, N-11-10-30.1

This notebook was used by Ludwig F. (Louis) Ott during October 1911-September 1913 for notes on various chemical experiments. Included are entries relating to chemical solutions for storage batteries, the preparation of cement for phonograph cabinets, the electroplating of disc records, and coatings for the insides of Blue Amberol cylinders. One entry contains a notation by Edison, indicating his direct supervision of Ott's work. The last page is an index to the experiments. The index has been filmed first. The book contains 185 numbered pages, some of which are blank.

Index –

New Cell. Cement Copper & Zinc dust Pages 1 – 2
White Cement Pages 3 –
Charging Storage Batteries from the Air Pages 4 –
Titration of Samples of Electrolyte 6 – 8
Experiment on Electrolytic Metallic Iron 9-10-12-14
Sörensen Fuller Lotts 11

Experiment upon rectifying power of Tungsten Bronze 17 – 19
" " stiffening of cement for Cabinets 35
Solubility of Bi Salts in LiOH + KOH 20 – 21
Experiments with rusting out Nickel Hydroxide 22 – 23
Exp. making Metallic Iron from Fe Hg Alloy – 27-34/61-62
Experiment on Ni OH. Bag Experiment 39 – 44
" " Phono Cabinet (Plaster) 45 – 46
" " Plating Hg Flake 48 – 53
Sol for removing ~~Copper~~ Epoxy from Masters (Formula) 55
Report by I.A.E. on Cu Ni Plating 65 – 66
Exp. on Heavy Nickel Plating 70 – 77
Fusable Alloys 78 – 79
Exp. on Record Material 81
Exp. on coloring Plaster Pieces 83 – 84
Sol. to coat inside of B. Ardsley Records 85/95 – 98
Dielectrics for Spillers used on Disc Records 86 – 94
Formula for Fill Waterproof for Floor Molding
Experiment to Plate upon wax by means
of various Bronzes as a conductor 100 – 106

Formula for Celluloid Paint Page 107
Table of Solubilities H & Merz Aniline Colours
sol. in Alcohol 109–111
Reduction of Metallic Silver on Graphite – 112 – 118
Kolloidaly Augmentum 118 – 121
[illegible] 121 – 125
Sol. #3 for sticking Celluloid to Blank 125 – 126
Exp. To get rid of dust and grease fatties on water 126 – 129
Stannous Chloride Sol for Mr Dimmidie 157 –
[illegible] 158
Test of H & Merz Aniline Dyes sol in H_2O 163
Rosin Soap 167 – 171
H_2O 172 – 175
Volatization of Various Chemicals
for use in disc records 176 – 178
Properties of Phenol & Cresol
Resin under heat 179
Rosinew Seife 180
Stannous Chloride Sol 181
Mattoll zu Schwarzen ~~183~~ 184
Glucoseimpfen zu Farben 183
Bruhze Lüsz Gloff 184
Isolation Mottof Gloff. 184
ACN Citrien Lösung (Dimmidie) 185
Insalpte — 126

Mittel für Unterdrückung von Glü Lampen
7 Ohm Flow von Cypern gelöst in Angl Mentat
1/2 + Alkohol 1/2

für	Grün	Kalter	Kreuz	Grün M.
"	Blau	"	"	Blau B Me Löslich.
"	Roth	"	"	Fuchsin R.T.

11-10-30.1

49290
Lum Co.,
MFG. STATIONERS,
69 FULTON STREET,
NEW YORK.

Experiments by
Ludwig F. Alt

Oct. 30, 1911

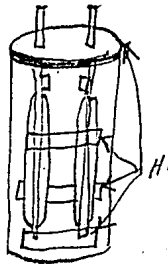
Experiment on New Cell.

Made Copper Cement by dissolving $CuSO_4$ in H_2O and reducing with metallic Zinc the excess Zinc dissolved and in dilute H_2SO_4 washed and dried in vacuum.

Two tubes were made

1st #	Zinc	grams	per	dump.	dumps
2nd #	Copper	"	"	"	"

These were put into a glass jar filled with 20 grams Na Mono sulphate dissolved in 100 g H_2O.



Results Negative

Nov. 9 1915

No 8645 One tube Zinc Powder & Ni 7 Cake other tube $Ni(OH)_2$ + Ni 7 Cake Electrolyte Sat Sol KOH.

Results Negative

8646 One tube Zinc Powder & Ni Cake other tube $Ni(OH)_2$ and Ni Cake Electrolyte 5 lb KOH + 1 g LiOH per Gal

Results Negative

Experiment to Make White Cement. Nov 6, 1915

Three samples of cement were made
#1 Cement straight mixed and let set 56 hours
#2 Cement 1 Sand 2 " " " " " "
#3 " 1 " 3 " " " " " "

These samples were put into a blast furnace and heated to 2000°F. then held there for 5 minutes then allowed to cool.
They all became dark with yellow blebs of Fe interspersed here and there in the sand mixtures.

The same Nos 1, 2, 3, samples not previously heated were then put into a tube (porc) and heated to 2000°F with a stream of hydrogen running through these samples came out whiter than the original samples after setting but not white enough to warrant their use as a white cement.

Some cement dry from the bag was next treated in hydrogen and a sample sent to Mr. Mallory this came out whiter than the original cement but not white enough

Nov. 1, 1911

Charging Storage Batteries from the Air

A copper wire was run to the top of the flag pole on the Laboratory roof thence down on glass insulators on the side of the building through the Library window. The grounded wire was run ~~to a water~~ pipe in the cellar

A Deadwood Galvanometer was connected through a telegraph key as contact breaker to the two wires so far there is no sign of a current.

Drum # 75 C 25+15 Dec. 1, 1911

14.7800
14.0411
.7389

77.9
70.6
7.3

4.4793
8.6332
13.1125
8.6853
4.4272 = 27.72%

27.72%

Bronze for Bliss Dec. 1, 1911.

Total = 14.7742
Glass 13.7185
Bronze = 1.0557

Drum # 95 C 25+15 Dec. 1, 1911

14.6940
14.0411
.6529

84.35
77.9
6.45

4.4793
8.0956
12.5749
8.1485
4.4264 = 27.71%

27.71%

Drum # 146 C 25+15 Dec. 1, 1911.

14.7807
14.0411
.7396

91.7
84.35
7.35

4.4793
8.6629
13.1422
8.6900
4.4422

27.81

27.81

Sample Electrolyte from New York Navy Yard for H_2SO_4 Det — Dec 1, 1911

16.3235
14.0411
2.2824

Li OH + KOH Atomic Trade Co — Dec. 4 1911

14.0413
4.0462

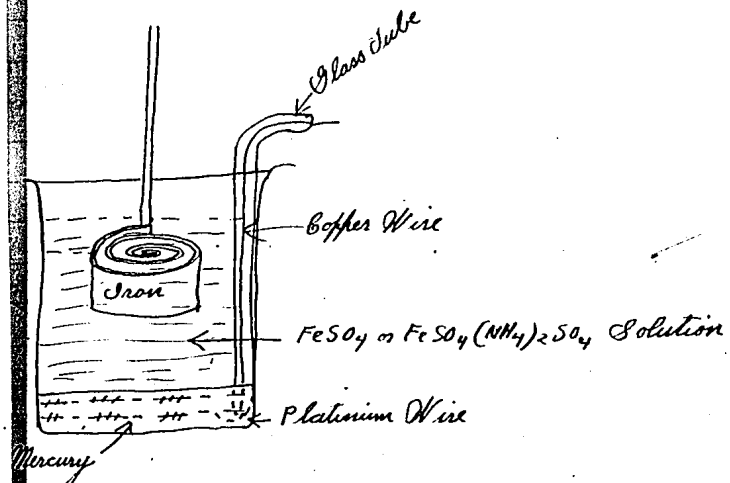
Total = 17.4820
Total = 14.2138
Lauge = 3.2682

Plat. Sugd = 38.9030
3.2682
42.1712

Dec 17, 1911

Method for making Iron (Metallic)

The method consists of passing an electric current through an Iron anode to a mercury cathode in an Iron bath probably $FeSO_4$ + Aq. or $FeSO_4(NH_4)_2SO_4$ + Aq.



1st experiment

The Iron was plated in a $FeSO_4$ Sol. of about 20g $FeSO_4$ + Aq. per Liter 100cc H_2O with 2 lamps about .8 Amp. The mercury became thick. The basic salts formed were frequently filtered off and fresh $FeSO_4$ added to the solution

After the Hg became pasty it was removed washed with water and dried between filter papers then put into a tube heated to 800°F and H passed over until cool

The second experiment will consist of the same operations as the first but when nearly cool the H will be replaced by Nitrogen made by passing air through a solution of Ferrous Hydroxide suspended in water then a solution of Potassium Hydroxide and Pyrogallic acid, then through 2 bottles of H_2SO_4

Säure Ester Lack.

Der Lack wird gemacht wenn man proportion 1-1 500 der beiden Lateruium et Gilnesum kocht unter druck in ein druckbesterkessel. 500-500 1 gal. Allgemeine Lösung.

Experiment on Electrolytic Iron (continued)

Made electrolytic iron in the same manner as described on page 9 except that when plated the amalgam was pressed in the iron cake die at 300 atm. to effell excess of mercury from these the cake was transferred to a pocket fit into a frame and pressed regular 100. S.P. 150 corrugated at both of these pressings more mercury was effelled these following numbers made in this manner were immediatly dipped in 21 + 2 and run in 21 KOH + 2 LiOH.

4997 no weight taken

4998 total weight of Iron and Mercury = 17.300 grams. they are marked in Mr Edisons note book as I. Ell #1

Experiment # 2

In this experiment I shall endeavor to get more iron into the mercury by stirring the mercury with a rubber stirrer – I shall also make up several pockets in which different pressures will be used on the S.P. and corrugating in order to press out more mercury.

Grams Hg.	Current Amp.	Voltage	Time	Weight of Hg after plating	Sol used	Sp. G. Sol.	cc sol used.
4,880	5		70 hrs.	5,135	Fe NH_4SO_4	1,110	2,500

The gain in weight for 70 hrs plating at 5 Amp rate using a $FeSO_4NH_4SO_4$ sol. = 255 grams.

No 4 The electrolytic Iron was put into a tube after absorbing the water with filter paper and pressing out the excess of Hg with a chamois ~~through~~ this tube was connected with a suction pump and a vaccum of 28" Hg was obtained then heated to distill off the mercury while still in vaccuo — after which nitrogen was passed.

Nitrogen — Air passed through a sol of 10 - 15% NaOH + 5 spoonfuls of Pyrogallic acid to the quart of the solution. Thence through $CaCl_2$ tube thence over copper turnings heated red hot thence through another $CaCl_2$ tube —

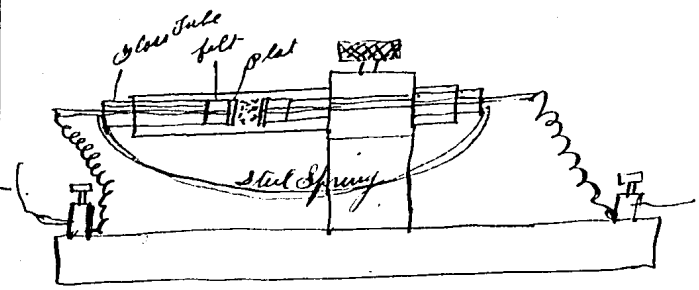
No 5 Made the same as No 4 except that Hydrogen was substituted for the vaccum.

Experiment upon the rectifying power of Tungsten Bronzes

Golden Yellow Bronze

+ Metal	— Metal	Milli Amp.	+ Metal	— Metal	Milli Amp.	+	—	Mill Amp. V.	+	—	Mill Amp. V.
al	al	140/120	al	al							
ass	Brass		Brass	Brass							
d.	Cad.		Cad.	Cad.							
lon	barlon		barlon	barlon							
	Cu		Cu	Cu							
e	Fe		Fe	Fe							
b	Pb		Pb	Pb							
i	Ni		Ni	Ni							
g	Ag		Ag	Ag							
n	Sn		Sn	Sn							
l	Brass	140/120	Brass	al	135/120	al	Brass		Brass		
	Cad	140/120	Cad	"	135/120	"	Cad		Cad		
	barlon	135/120	barlon	"	135/120	"	barlon		barlon		
"	Cu.	135	Cu.	"		"	Cu		Cu		
"	Fe.	135/120	Fe.	"	135/120	"	Fe		Fe		
"	Pb.	135/120	Pb.	"	135/120	"	Pb		Pb		
"	Ni.	135/120	Ni.	"	135/120	"	Ni		Ni		
"	Ag.	135/120	Ag.	"	135/120	"	Ag		Ag		
"	Sn.	135/120	Sn.	"	135/120	"	Sn		Sn		

+ Metal	— Metal	Mil. Amp.	+ Metal	— Metal	Mil. Amp.	+ Metal	— Metal	Mil. Amp.	+ Met	— Metal	Mil. Amp.
Brass	Cad		Cad	Brass		Cu	Fe		Fe	Cu	
"	Carbon		Carbon	"		"	Pb		Pb	"	
"	Cu		Cu	"		"	Ni		Ni	"	
"	Fe		Fe	"		"	Ag		Ag	"	
"	Pb		Pb	"		"	Sn		Sn	"	
"	Ni		Ni	"		Fe	Pb		Pb	Fe	
"	Ag		Ag	"		"	Ni		Ni	"	
"	Sn		Sn	"		"	Ag		Ag	"	
Cad	Carbon		Carb	Cad		"	Sn		Sn	"	
"	Cu		Cu	"		Pb	Ni		Ni	Pb	
"	Fe		Fe	"		"	Ag		Ag	"	
"	Pb		Pb	"		"	Sn		Sn	"	
"	Ni		Ni	"		Ni	Ag		Ag	Ni	
"	Ag		Ag	"		"	Sn		Sn	"	
"	Sn		Sn	"		Ag	Sn		Sn	Ag	
Carbon	Cu		Cu	Carbon							
"	Fe		Fe	"							
"	Pb		Pb	"							
"	Ni		Ni	"							
"	Ag		Ag	"							
"	Sn		Sn	"							



Solubility of Bi Salts in 21% KOH + 11.2 LiOH per Liter

			Filtered acidified found H_2S
1	Bismuth	Sub Nitrate	Trace
2	"	Nitrate	"
3	"	Tannate	Good prec
4	"	Na Benzoate	Nil
5	"	Salicylate	Nil
6	"	Benzoate	Nil
7	"	Oxalate	Trace
8	"	Citrate	Trace
9	"	Ammon. Citrate	Nil
10	"	Lactate	Nil
11	"	Borate	Nil
12	"	Iodide	Nil
13	"	Bismuthic Acid	Trace
14	"	Beta Naphthate	Nil
15	"	Chromate	Nil
16	"	Sulphate	Trace
17	"	Camphorate	Nil
18	"	Lactate	Nil
19	"	Cerium Salicylate	nil
20	"	Bromate	Nil
21	"	Phosphate	Nil
22	"	Boro Salicylate	Nil
23	"	Propionate	Nil
24	"	Tri Chromo Carbolate	Nil
25	Bi	Sulfo Carbolate	nil
26	"	Bismuthate	nil
27	"	Cerium Oxalate	nil
28	"	Sub Carbonate	nil
29	"	Citropicide	nil
30	"	Tartrate	Totally soluble soluble prec
31	"	Oxychloride	Trace
32	"	Fluoride	Nil
33	"	Chromate	nil
34	"	Tungstate	nil
35	"	Salicylate	nil
36	"	Oxyiodide	nil
37	"	Arsenate	nil
38	"	Butyrate	Trace
39	"	Oxychromide	nil
40	"	Permanganate	Trace
41	"	Na Iodide	nil
42	"	Pyrogallate	Large prec only sol
43	"	Sub Benzoate	nil
44	"	Sulphide	nil
45	"	Molybdate	nil
46	"	Carbolate	nil
47	"	Na Salicylate	nil

Solubility of Bi Co Hydroxides and HgO in 21% KOH + 11.2 g LiOH per Liter both straight and by the addition of other salts in small proportions

Patent #3

Private Experiment by Ludwig Jan. 30, 1912.

A Method to reduce or coat by reduction $Ni(OH)_2$ with a coating of metallic Bismuth to be used as such, or as a base for contact to plate another metal thereon.

1 $Ni(OH)_2$ is treated with a solution of Stannous Chloride then there is added thereto a solution of Caustic Soda Potash or Lithia or Ammonia which contains a Bismuth salt in solution preferably Bismuth Tartrate. whereupon the Bismuth is reduced to metallic Bismuth upon the surface of the $Ni(OH)_2$ washed with an alkali and then with water and dried.

2nd Method A caustic solution of Na. K. or Lithium or Ammonia containing the aforesaid Bismuth Tartrate is brought in contact with the $Ni(OH)_2$ and a reducing agent applied ~~such~~ or added ~~such as~~ preferably Formaldehyd Sugar or Glucose whereupon the Bismuth is reduced as metallic Bismuth upon the $Ni(OH)_2$

3rd Method A $Ni(OH)_2$ containing Bismuth Hydrate made by precipitating the two together or by adding Bismuth Hydrate while making the $Ni(OH)_2$ by precipitation mechanically stirring and cooking the same.

This Bismuth Nickel Hydrate is treated with a solution of an alkali such as Na OH K OH Li OH or Ammonia and a reducing agent added ~~such~~ preferably Formaldehyd Sugar or Glucose. whereupon the Bismuth Hydrate in the Nickel Hydrate is reduced to Metallic Bismuth. The addition of Bi Tartrate to the Alkaline solution may be used but it was found to be unnecessary.

Ludwig Alt.

In making the Nickel Hydrate containing Bismuth while mixing the $Ni\,SO_4$ and Na OH and boiling the Bi added can then be reduced by a reducing agent Formaldehyd Sugar or Glucose preferred. then dried percolated and dried again.

Sol. $(NH)_2FeSO_4 6H_2O$ Sp. G. @ 20°C	Total Anode Surface in □ inches	Weight of Anode	Weight of Anode after plating	Amp.	Volts	Hours Time	Amp. Hrs.	Watts
1150								
Time Start.	Time Finish							

Time of Trials			
Voltage	2.2		
Amperage	1.1		
Amt. H_2O		Wt. of Amm Alum H_2O	23
Wt. of Bommed		Wt. of $(NH_4)_2Fe(SO_4)_2 \cdot 6H_2O$	1150 @ 20°C
Wt. of Iron Alloyed Fe		% of Fe in $Fe(SO_4)(NH_4)_2 \cdot 6H_2O$	24%
Wt. of Anode Iron taking	42.8070	Weight of Dry Hydrat.	
Wt. of Anode after taking		No of cc. 275	275
Iron in Weight Anode			
Anode empty in □ in	18.250 -18¼		
Weight of Hg after taking	600 grams		
Weight of Hg after taking.			
Gain in Weight = Fe. Deposition.			
% gain of point of Deposition			
Electric empty in □ in	2.1597		
Time of Test	9.45		

By distillation in H. and passing N. from air —

Quantity of Amalgam Taken = 10 g

Quantity of Hg obtained =

Quantity of Fe obtained =

Quantity of Hg Amalgam Taken =

" " Fe found by Analysis =

Hg by difference =

Total =

Filter paper =

Fe_2O_3 =

Became thick

1st. sample taken at 4.45 Time 7 hrs.

Contains Hg = Fe = Fe per hour =

Fe per amp hr = Fe per Watt hour =

Weight anode = 34.3610 Loss = 8.4460

Anode = 42.8070 Weight Hg 21.1463

Anode = 34.3610 14.0410

Loss = 8.4460 7.1053

2nd Sample taken at 8.45 Time 27 hrs

Contains Hg = Fe = Fe per hour =

Fe per amp hr = Fe per Watt hour =

Weight Anode = 24.6100 Loss = 18.1970

Anode = 42.8070 Weight Hg = 49.2560

24.6100 34.4570

18.1970

Weight of Anode = 122g

Weight of Hg = 1500g

Cu Sol = 500

Temp Start = after 1 hour

Amperes 2.

Volts 3 drops to 2.6 and then remains

Anode surface

Cathode surface

Sp. G. Sol at 20°C = 1150 = 24% $(NH_4)_2SO_4 + 6H_2O$

Speed of propeller 160-180

Time of 1st Sample when it became thick =

Time of 2nd Sample " " " liquid again =

Time of Start 24 8.30 A.M. Stopped 2 PM 5½

26 Start 9.00 A.M. 1.00 PM first sample 4

taken it then became thick.

Started 27 11.45 A.M. Stopped 1.35 to repair 1.50

Stirrer Restarted 2.05 1/2 hour. 4

Stopped 6.00 Started 28 9.00

9.30 Sample It again became liquid. 1st

Stopped 6.00 Start 9.00 Stopped 5.30 Mar 29

Start. 10.00 a.m to 12.00 Mar. 1

~~8.30 to 6.00 at 5 amp Rate drop rate~~ Mar. 1 3.30 to ~~6.00~~ 5.30

Mar 2 8.30 to 3.30 again became ~~thick~~, Temp 70°C

Mar 7 Start 11.00 new anode Stopped 5.30

Start 8th 9.00 to 5.30

Start 9th 9.00 to ~~4.00~~ 12.00 24 hrs 5 amp Rate

11th 9.30 to 11.00 Total Entire time = 63 hrs.

Analytical Results for Iron Plating

Sample taken when the mercury became thick
Time 9 1/2 hours running

Total 32.0300
boat 3.3017
Amalgam 28.7283
.3713 Fe found
28.3570 Mercury by difference

Total = 3.6730
boat = 3.3017
.3713 Fe

Total = 144 Rough Scale
Tube = 116
28.g Mercury left in tube

The sample was placed in a boat which was inserted in a glass tube, H was then passed over and heated to distill off all the Hg. then cooled in a stream of nitrogen. It was found that for the 28.7 g of Amalgam taken there was .3713 g Fe leaving leaving 28.3+ grams of Mercury. The distilled mercury in the tube was then weighed as a check and found to be 28 g. this shows that there is no loss in Mercury by distillation.

28.357 g Hg contains .3713 g Fe 1500 g will contain $\frac{1500 \times .3713}{28.357}$ or 19.638 g Fe deposited

in 9 1/2 hours at 2 amp. = 2.06 g per hour = 1.03 grams per hour per amp. = 0.198 grams per watt hour

28.357) 1500,000 00 (52.89
141785
82150
56714
254360
226856
27504

52,89
.3713
15867
5289
37023
15867
19.638057 g deposited

9.5) 19,638 (2.06 g deposited per hour
190
638
570

2) 2.06 (1.03 g per amp hour
2
06
4

2.6 V
2 a
5.2 Watts.

5.2) 1.03 (0.198 grams Fe per Watt hour
52
510
468
420
416

Second Sample taken after 32.50 hrs min
hours 17 hours after the Hg again became liquid

Total = 32.0733
Boat = 3.3017
Amalgam = 28.7716
Hg = 1.1053
Hg = 27.6663 g.

Total = 4.4070
Boat = 3.3017
Fe = 1.1053

1500 g Hg
— say 30
1470 g Hg

Total = 127
Lube = 98
029 g Hg.

$\frac{1470 \times 1.1053}{27.6663} =$

27.6663.) 1470000.00 (53.12
1383315
866850
829989
368610
276663
8194.70

1.1053
53.12
22106
11053
33159
55265
58.713536 deposited Fe in 33 hrs

33) 58.713536 (1.78
33
257
231
261

2) 178 (.89 g per Amp
16
18
18

Anode 122 grams
64 grams after 1 32.50 say 33 hrs
58 this agrees with the figure 58.71 as it was weighed on the rough scale.
This drop may be caused by the mercury becoming so thick th
by the propeller it was scraped away from the platinum contact at the

Total Hg taken out for samples = 1st 28.3570
2nd 27.6663
again became thick 3rd 24.8033

3rd sample

Total 28.1050
boat 3.3017
24.8033 Amalgam

Total 5.0884
Boat " 3.3017
1.7867 Fe

Total Hours 35 hrs at 2 amp.
9 hrs at 5 amp.? bad Meter slides

29 hrs at 5 amp = 145 amp hrs
34 hrs at 2 amp = 68 " "
Total = 213 amp hrs.

2080

Experiment upon Stiffening Cement for Cabinets
Feb. ~~24~~ 23 1912

A large mould was made having 8 ~~shoulds~~ 8" X 12" X ½" deep. this was smeared over with a very slight amount of some greasy matter so that the wood would not warp.
Each slab contains 1500 g cement + 500 cc H_2O. in the mix

#1 Neat Cement.
#2 " " with expansion grating
#3 " " " cheese cloth.
#4 " " " cow hair 15 grams
#5 " " " sulphite pulp cut ▭ 15
#6 " " " Oxychloride of Magnesia 60 gm
#7 " " " " " "
#8 Plaster Paris ——
#9 " " with expansion grating Good
#10 " " " cheese cloth
#11 " " " cow hair
#12 " " " sulphite pulp ▭
#13 " " " Magnesium Oxychloride
#14 Neat Cement " 15g Hemp —— Good

Note #6 contains per 1500 g cement ~~40~~ grams Magnesium Oxide ~~20~~ 20 ~~Cms~~ grams Magnesium Chloride in the ~~500~~ 1000 cc H_2O added.

#7 Mixed the Magnesium Oxide and Magnesium Chloride together first and then with the cement. ~~proportion same as in #6~~ added to the remainder left from #6 200 g cement 40 g. Mg O and 20 g Mg. Chloride

In the plaster Paris compositions there was used 700 g Plaster Paris 700 grams water
#11 15 g cow hair
#12 15 g Sulphite pulp
#13 ~~2~~10 g Mg O + 20 g Mg Chloride dissolved in the 700 cc Water while the Mg O was mixed up with the plaster Paris

Magnesium Oxychloride

#1	Mg Oxide	high calcined	20g	Mg Chloride	10g	H_2O	10g
#2	" "	" "	20g	" "	15g	H_2O	10g
#3	" "	" "	20g	" "	5g	H_2O	10g
#4	" "	" "	10g	" "	5g	H_2O	10g
#5	" "	" "	10g	" "	5g	H_2O	15g
#6	" "	" "	10g	" "	5g	H_2O	~~20~~ g
#7							
#8	Mg Oxide	not heated	20g	Mg Chloride	10g	H_2O	35g
#9	" "	" "	20g	" "	15g	H_2O	35g
#10	" "	" "	20g	" "	5g	H_2O	35g

X dust flows y flows easily

Nos 8, 9, 10, required 35 g of water and they were very stiff at that.

1,200 g cement per plate

15 Keenes Cement — Strong much stronger than Nat P with
16 " " with expanded metal Cant break
17 " " with cheese cloth — easy break — plumbly strong
18 " " with 30 g cow hair
19 " " with 15 g sulphite pulp very stiff
20 " " with 5 g hemp rope N.G.

2 of fine sand pumice
4 " of 1/4 "
1 of Keene

Little 2. of Keene
" 3 of K

21 { 200 g Fine Pumice
400 g 1/8 "
400 g Keenes

22 { 200 g Fine Pumice
400 g 1/8 "
600 g Keenes

23 { 200 g Fine Pumice
400 g 1/8 Pumice
800 g Keenes

good results of one unit of the lot

4 { 200 g 1/8 Pumice
800 g Keenes
no fines

21 to 28

By volume

25 { 2 Fine Pumice
4 1/8 Mesh
1 Keenes

26 { 2 Fine Pumice
4 1/8 "
2 Keenes

27 { 2 Fine Pumice
4 1/8 "
3 Keenes

28 { the rest from 27 mixed with one one second Keenes.

Magnesium Oxychloride has too great a contracting power ~~in order to~~ With the proportion of 20 g MgO. 10 g MgCl2 and 10 cc H_2O the contracting power is at its minimum and makes a smooth cake but it cannot be poured as it is then a stiff paste the more the proportion of water is increased the greater the contracting power

Experiment on Nickel Hydrate

Nickel Hydrate made in the following proportions. 520 grams of Na OH Sp.G. 1220 @ 20°C 20% into which was poured slowly while stirring 690 grams Nickel Sulphate Sp.G. 1.335 @ 20°C about 27% cold. This was then passed through the filter press and pressed into cakes in such a way that various amounts of the resulting Sodium Sulphate solution was filtered off then dried in drier at between 85° – 90° C.

#925 Experiment. Trial Sample #1 Filter Press

The Nickel Mush made in the above proportions was ~~pressed~~ pumped through the press all of it would not go through as I had only four chambers in operation. Pressure on gauge 18 lbs. Used double proportion. Liquid pressed out 645 grams.

Total weight of plates and cakes = 4,470 grams
Weight of plates = 3 560 grams
Weight of cakes = 910 grams

Ni SO4 1380 — 910 grams Cake
Na OH 1040 — 645 grams Sulphate Liquor
Mush = 2420 — 1,555 grams mush pumped throu

Recolated 3/23/12 Recolated 3/23/12 Sent to acc
12 3/29/12

Filter Press

2nd Trial #926

690 Ni SO4
520 Na OH.
520 g Na SO4 [illegible] out
320 g Mush pressed
1660 g Weight of plates & cakes

#3 Bag Experiment 927

690 Ni SO4
520 Na OH } 110 g Sulphate Liquor squeezed out (10%)
Put in to dry March 21 5.00 PM
Dry Mar 24 12 Noon 77 hrs

#4 Bag Exp. 928

690 Ni SO4
520 Na OH } 220 g Sulphate Liquor squeezed out (20%)
Put in to dry Mar. 22 5.00 P.M.
Dry Mar 24 12 Noon 77 hrs

#5 Bag Exp. 929

690 Ni SO4
520 Na OH } 330 g Sulphate Liquor squeezed out (30%)
Put in to dry Mar. 22 5. P.M.
Dry. Mar 24 12 Noon 77 hrs

#6 Bag Exp. 930

690 Ni SO_4 } 440 g Sulphate Liquor squeezed out (40%)
520 Na OH }
Put in to dry Mar. 23 ~~4.00 PM~~ 12.00 Noon
Dry. Mar 24 12 Noon 24 hrs

931 #7 Bag Exp. Bag Burst

690 Ni SO_4 } 490 g Sulphate Liquor squeezed out 44.5%
520 Na OH }
Put in to dry Mar 21 · 5.00 P.M.
Dry March 22. 10.00 AM = 1 hrs.

Bag Exp. #8 Linen Sowing. 932

690 Ni SO_4 } 550 g Sulphate Liquor squeezed out 50%
520 Na OH }
Put in to dry Mar 23 10.00 A.M.
Mar 24 12 Noon

Bag Exp. 9 933

690 Ni SO_4 } 660 g Sulphate Liquor squeezed out 60%
520 Na OH }
Put in to dry Mar 23 12.00 Noon
Dry Mar 24 12 Noon

The following tests were made by mixing cold
690 g Ni SO_4 Sp. G. 1335 @ 20°C and
520 g Na OH Sp. G. 1220 @ 20°C
Stirring well with an egg beater let stand for 2 hours and again stirred then squeezed in bag.

10 934 2 Boxes Depth 2½"

690 Ni SO_4 } cold. Bag process 110 g = 10%
520 Na OH } Na_2SO_4 Sol. squeezed out
Put in to dry Mar 27 5.00 PM April 2, 8.00 AM
Total 88 Fines 14

11 935 2 boxes Depth 2¼"

690 Ni SO_4 } cold Bag process 220 g = 20%
520 Na OH }
Put in to dry Mar 27 5.00 PM April 2 8.00 AM
Total 88 Fines 15

12 936 1 Box Depth 3"

690 Ni SO_4 } cold Bag Process 330 g = 30%
520 Na OH }
Put in to dry Mar 27 5.00 PM April 2 8.00 AM
Total 80 – Fines 12

13 937 1 Box Depth 2¾"

690 Ni SO_4 } cold Bag Process 440 g = 40%
520 Na OH }
Put in to dry Mar 27 5.00 P.M. April 2 8.00 AM
Total 86 Fines 18

14 938

690 $Ni SO_4$ } Cold Bag process 550 = 50%
520 $Na OH$ }

Put in to dry Mar 30 12.00 AM April 2 8.00 AM
Total 86 fines 10

15 939

690 $Ni SO_4$ } Cold Bag Process 660 = 60%
520 $Na OH$ }

Put in to dry Mar. 30 12.00 A.M. April 2 8.00 AM
Total 80 Fines 15

The following hydrates were made as follows 690g $Ni SO_4$ Sp.G 1335 @ 20°C was heated to 75–80°C and poured into 520g $Na OH$ Sp.G. 1220 @ 20°C also 75–80° under constant stirring. then they were allowed to be stirred for 10 minutes keeping the temperature at 75–80°C taken out and the following proportions of sulfate liquor squeezed out of bag.

16 940

} 3 3/4" 110g = 10%

Put in to dry Mar 29 5.00 PM
Total 82 grams fines 12

17 941

} 3 3/4" 220g = 20%

Put in to dry Mar 29 5.00 PM.
Total 78 fines 15

18 942

} 3 1/2" 330g = 30%

Put in to dry Mar 29 5.00 P.M.
Total 9[illegible] fines 16

19 943

} 3" 440g = 40%

Put in to dry Mar 29. 5.00 PM April 3, 8.00 AM
Total 99 fines 13

20 944

} 2 1/2" $Na_2 SO_4$ 550g = 50%

Put in to dry Mar 29. 5.00 PM April 2 8.00 AM
Total 86 Fines 14

21 945

} 2" 660g = 60%

Total 99 Fines 22
Put in to dry Mar. 29 5.00 PM April 2 8.00 AM

Experiment on Phono. Cabinet Mar 5th 1912

After a mould was made a cabinet was poured of Keenes cement. using 23 lbs Keenes and 2/3 pail of water this was for the bottom sides and back the top, grill work being poured seperate.

The second cabinet was poured using about 3/4 pail of water and found to come out bad too thin a mixture

The third cabinet 1/2 pail of water was used and found to come out much better than the first.

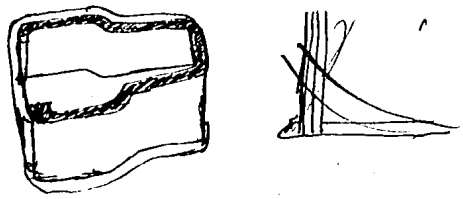
The cabinet was poured bottom up and the mixture pumped with a stick ~~so~~ in order to avoid bubbles —

Then the bottom was bolted on and the entire mould turned over bottom down.

In bolting the bottom on the excess of water is squeezed out because the mould is ~~made~~ poured a little full.

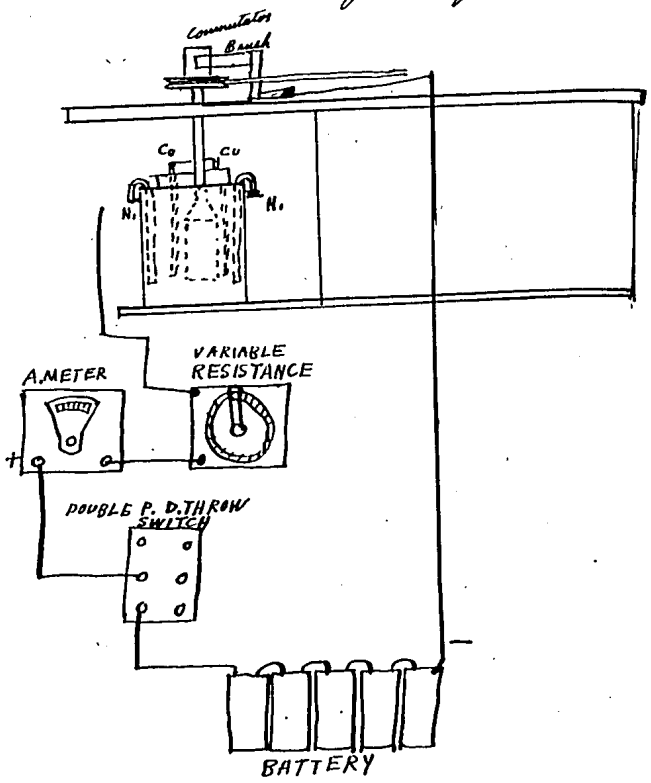
After hardening from 18—24 hours the mould is removed then after standing in open air 24 hours painted with a sol. of 10% $H_2SO_4 + Al_2SO_4$ —

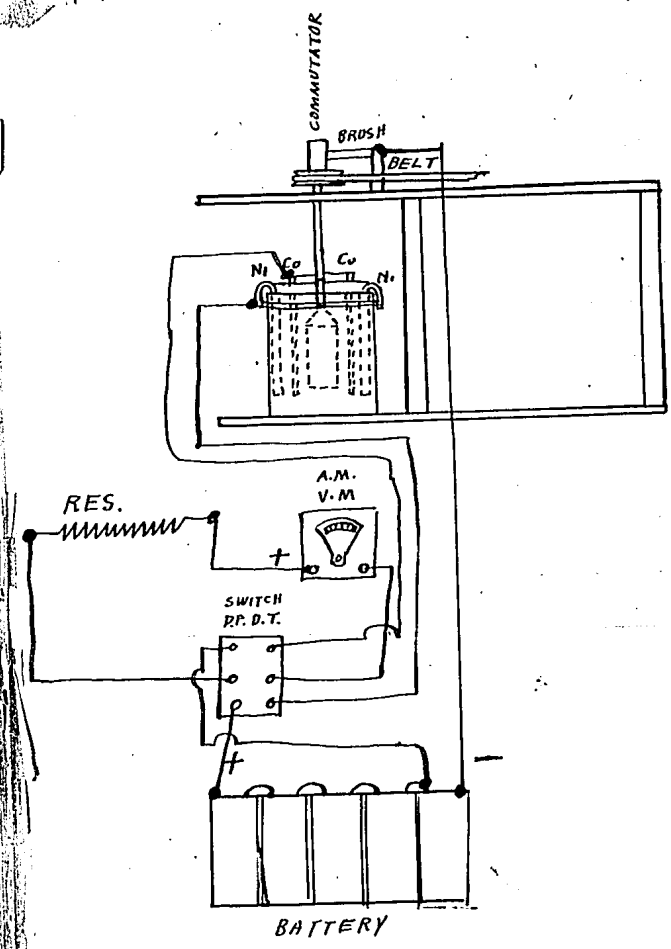
For removing finger marks it was found that by painting the surface with starch paste a thick coating allowing it to dry and then rubbing off with a stiff brush that all the dirt came off with the starch paste.



J. Harper — 2. Ott.

Nickel Plating Wiring





Page # 2964

Experiment on plating Ni Flake

This experiment is to see if nickel flake can be made in one bath by plating in one bath both nickel and copper alternatly.

Solution Nickel Sulphate was kept neutral by the addition of $Ni(OH)_2$ when necessary.
Found that in a neutral or nearly neutral solution copper would not plate while nickel would plate good in a slightly acid solution but not in an absolutly neutral one.
When the solution was made acid enough to redden litmus paper and not enough acid to blue congo paper. I could get a good copper plate and also a good nickel plate for about four layers after which the nickel plate became bad. (black)
These conditions were tried with various current conditions on both the Nickel and copper plating as the copper plating requires a very low current density the range was from 1/10 amp. to 1 amp. of course varing the time according. while the Nickel range was from 5 amp. to 20 amp. varying the time according the best results were obtained on the nickel between 10-15 amp. for about 3/4 to 1 min while on the copper 1/2 amp for 1 min and 1/10 amp for 5 min. gave best results, unless the bath was made quite acid it was found that quick deposits of copper were impossable.

Experiment on plating Tablet

Solutions

#3	Neutral	$NiSO_4$	+	1%	Acid Boracic
4	"	"	"	+ 1%	" Citric
5	"	"	"	+ 1%	" Tartaric
6	"	"	"	+ 1%	" Acetic
7	"	"	"	+ 1%	Ammon Chloride
8	"	"	"	+ 1%	Nickel Chloride

The above solutions were tried the foreign acid being added to a neutral $NiSO_4$ sol. in order to see if these acids had the property of stopping the Copper from plating over while the nickel was being deposited

I also tried to stop the copper from plating over by interposing another cathode, that is a piece of iron was put into the solution and connected independently of the other circuit making the drum anode and the wire cathode for to plate copper from the drum with a weak current while Nickel was being deposited upon the drum with a high current. This so far has not proved entirely successful the number of layers at times were in this case increased to six when the nickel became bad.

I will now endeavor to try to introduce into the solution such things as H_2S or which will precip the Cu in the sol. before each nickel

plate.

Sp. G. of Ni Sol @ 20° C = 1,125
Quantity of Sol = 2200 cc
Acidity =
Acidity by Paper acid to litmus just acid to congo paper -

With the above solution I tried to plate Ni and Cu as follows.

Ni 1 min at 10-11 Amp.
then Cu 2 min at 3/10 Amp.
then Plate over from the Ni anode to the Copper anode in order to plate out excess of copper for 1 min disconnecting the drum.
the same as above except plated over for 2 min
the same as above except plated over for 3 min
" " " " " " " " 5 min
" " " " " " " " 10 min
" " " " " " " " 15 min

at when the solution stood over night with the Copper anodes taken out but the drum left in and disconnected I found in the morning that the drum was finely copper plated.

and that the nickel anodes if left in the bath

over night are coated with copper in the morning

3rd that with all wires disconnected from the anodes a current is indicated of about 100 Ma. between the Copper and Nickel Anodes showing a polarization in the cell.

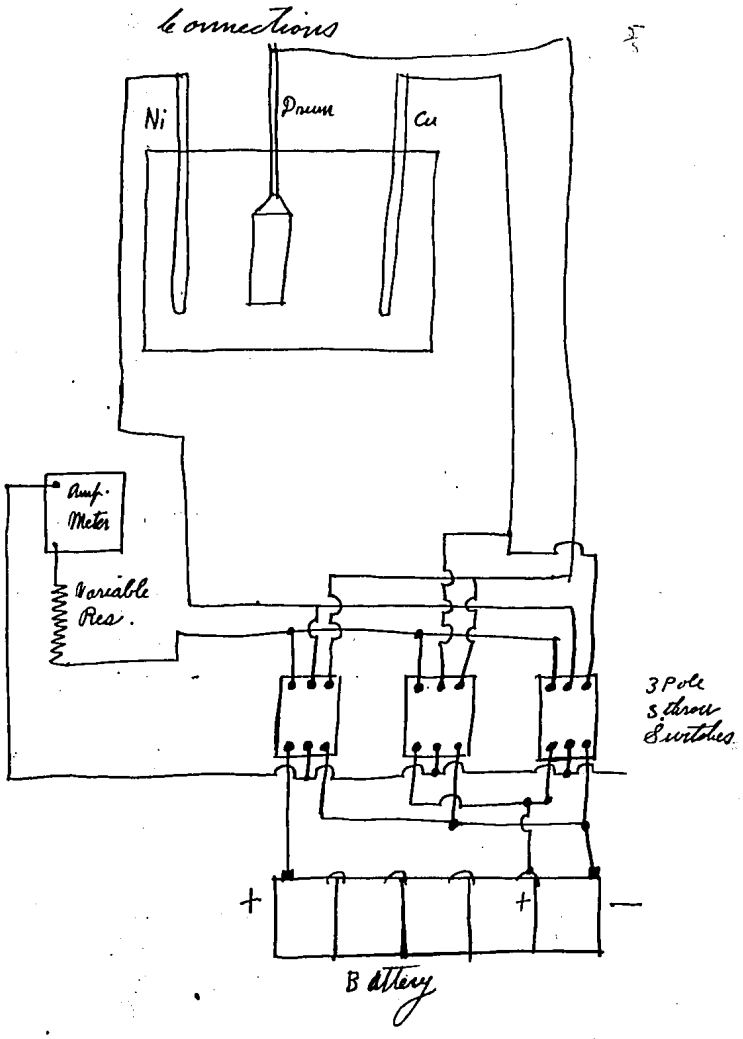
4th When I plate out enough copper to make my Nickel plate good then I get a bad copper when I want to plate copper again.

5th If I leave too much copper in the Solution so that I get a good copper plate then the Ni Plate goes bad.

6th. I obtained in one case Ni 1 min, Cu 2 min, Plate out or over 3 min, A drum of 8 layers then the Nickel went bad. and the plating was very rough.

7th. In all these cases when first plating the 1, 2, 3, 4 layers of Nickel are good.

8 th The plating went bad when the sol. contained 0.385 g of Cu per Liter.



Tried to plate ~~by~~ adding to the plating sol. a definite amount of a copper salt before each copper plate. Then plating the copper out to a certain point. (below $\frac{2}{10}$ grams Cu per liter) and then plating on the nickel In all cases no matter what the solution was the time took about 1/2 hour to plate out the copper enough to bring it around the $\frac{2}{10}$ g per liter then I had to add considerable more copper sol. in order to get a good copper plate again in this way the copper content of the solution gets a chance to build up again so that after anywhere from 8 to 12 layers the Ni Plate again becomes bad

Copper chloride plates a sort of green deposit as does also the Nitrate.
This we have from appearance and also from the analysis why is 10% HNO_3 added to a Nickel Sol when we want to plate out the copper and leave the nickel.

~~Copper~~ Nickel Chloride deposits a chlorine compound of Nickel (Green)

Sol. for Lifting Copper or Gold off the face of a record

3500 cc H_2O
100 cc 15% KCN
50 cc 4% = 3% H_2O_2

Urinary Analysis

Sp. G. up to 1018 directly for sugar 1018 to 1022 diluted twice 1022 to 1028 diluted five times using Emmes & Amends Saccharometer

Test with Fehlings Solution

Acetanilid: Extract with chloroform evaporate heat residue with Mercurous Nitrate (Green color.

Albumin acidulate with HCl add Hg Succinimide white cloudyness 1–150000

3.32 g KCl 1.35 g $HgCl_2$ in 20 cc acetic acid dilute to with 60 cc water
White precip. insol. in excess of acid
Precipitate redissolve on boiling
Prec. sol in Alcohol = Alkaloids

Biliary Acids Add 2/3 bulk conc. H_2SO_4 drop by drop. then add 1/5% sol. cane sugar violet color.

Ammonia Equal volume sat. sol $CuSO_4$ neutralize with Ba Hydrate filter and test filtrate with Nessler.

Blood Heat and add few drops Acetic Acid Brownish coagulum.

Iodine Blue color with starch paste + CS_2.

Mucin 2 Vol. absolute alcohol filter dissolve precip. in H_2O add acetic acid Turbidity insol in Excess but sol in HCl.

Nitric Nitrous Acids P phenylamine and Brucine Reaction also KI starch paste + trace H_2SO_4 colored deep Blue.

Oxalic Acid prec. with alcohol dissolve prec. in water add $CaCl_2$

Pus NaOH to sediment in bottom of glass (conical) pour off supernatant liquid and stir green mass.

Experiment upon Electrolytic iron
(Continued)

1 The iron made from the amalgam.
The Amalgam was put into a tube then heated to 400° ~~to 420°~~ C about 30 to 60° above the boiling point of the mercury ~~then~~ while a continuous current of hydrogen was being passed through the tube. the iron come out in a hard cake like a loaf of bread when rubbed or filed it showed a metallic lustre but did not run good (cooled in Hydrogen)

2 The same was repeated except that the temperature was raised to 450 °C same result

3 The same was repeated except Temp. 500°C same result.

4 The same was repeated as in 1 except that the iron was cooled in Nitrogen made by passing air through a sol. of pyrogallic acid in NaOH then over hot copper filings then ~~over~~ through H_2SO_4 and over Calcium Chloride. The iron was good but raked as in #1

The same as in #1 except that the amalgam was heated in a vacuum of 28" mercury and then nitrogen passed over on cooling this contained too much oxides —

Report to Mr Edison July 16, 1912

Mr Edison

The following experiments have been tried for plating both Cu & Ni, Zn & Ni, Cd & Ni, and Iron & Ni. I am now trying the iron & Ni using various current densities.

Solution	Anode	Remarks.
10g $NiSO_4$ + 10g $CuSO_4$	Ni	Plates Black
15g " " + 5g $CuSO_4$	Ni	" "
$NiSO_4$ + 1cc conc. $CuSO_4$	Ni.	" "
10g $NiSO_4$ + 10g $CuSO_4$ dissolved in 20% Sol KCN.	Ni	N.G.
10g $NiSO_4$ + 10g $CuSO_4$ Prec. with Na ortho Phosphate washed then dissolved in conc. sol Na Pyro Phosphate	Ni	Good Qualitative analysis shows about 1/2 Ni and 1/2 Cu.
All above repeated with	Mixed anode	Same results as above
10g $NiSO_4$ + 10g $ZnSO_4$		Plates zinc (Ni free)
15g $NiSO_4$ + 5g $ZnSO_4$	Ni	Plates zinc (Ni free)
$NiSO_4$ + 1cc conc. sol $CdSO_4$		Plates zinc (Ni free)

10g $NiSO_4$ + 11g $CdSO_4$	Ni	all Plate Cad. No Ni
5g $NiSO_4$ + 5g $CdSO_4$		
$NiSO_4$ + 1cc conc. sol $CdSO_4$		

If in an acid sol. even with a very small amount of Fe in sol forms needles at the anode which grow over to the cathode rapidly or fall to the bottom of the sol. I shall try some more on this.

10g $NiSO_4$ + 10g $FeSO_4$	Ni.	Plates fine Metallic but peels when 2/1000 of an inch thick.
8g $NiSO_4$ + 5g $FeSO_4$		
8g $NiSO_4$ + 2g $FeSO_4$		
5g $NiSO_4(NH_4)_2SO_4$ + g. $FeSO_4(NH_4)_2SO_4$	Ni	special lot next Page
8g $NiSO_4(NH_4)_2SO_4$ 2g $FeSO_4(NH_4)_2SO_4$	Ni	Special lot.
8g $NiSO_4(NH_4)_2SO_4$ + 2g $CdSO_4$	Ni	Plates cadmium no Ni peels.

# of Solution	Sol. used was $Ni\,SO_4(NH_4)_2SO_4 \cdot 7H_2O$ $Fe\,SO_4(NH_4)_2SO_4 + 7H_2O$	Quantity of sol. = Grams dissolved in 200 cc H_2O	No of Cathode	Metal used	Thickness of Cathode	Thickness Cathode after plating	Thickness of plate.	Current in Amps.	Time
1	20g Ni	0g Fe	1	Ni	.0334	.0358	.0012	.5	[illegible]
2	" "	1/2 "	2	"	.0335	.0348	.0007	"	2½
3	" "	1 "	3	"	.0332	.0343	.0005	"	5
4	" "	2 "	4	"	.0325	.0332	.00035	"	10
5	" "	3 "	5	"	.0330	.0338	.0004	"	15
6	" "	4 "	6	"	.0329	.0340	.0005	"	20
7	" "	5 "	7	"	.0321	.0340	.0005	"	25
8	" "	6 "	8	"	.0332	.0348	.0008	"	30
9	" "	7 "	9	"	.0334	.0348	.0006	"	35
10	" "	8 "	10	"	.0327	.0337	.0005	"	40
11	" "	9 "	11	"	.0330	.0334	.0002	"	45
12	" "	10 "	12	"	.0328	.0331	.0001	"	50
13	" "	11 "	13	"	.0335	.0337	.0001	"	55
14	" "	12 "	14	"	.0322	.0324	.0001	"	60
15	" "	13 "	15	"	.0328	.0330	.0001	"	13
16	" "	14 "	16	"	.0334	.0335	.00005	"	[illegible]
17	" "	15 "	17	"	.0330	.0332	.0001	"	75
1.	" "	1/4 "	1a	"	.0310	.0421	.0055	"	[illegible]

Remarks. On the foregoing table it will be noticed that the plating failed the sooner the more iron. The amount of iron known. Sulphuric [illegible] sol. It will be noticed also that the plating deposit stopped when it was very thin on the high % Fe Solutions Nos 1 and Nos 2 are the only ones which can be considered No 2 stopped when .0007 thick No 1 did not stick so I made one marked 1a which ran for a long time a little over allowing out the deposit calipers.

Results .0421 − .0310 = .0055 thick minus the glass are $\frac{10}{1000}$ thick per side. The sol contained after this plating only trace of iron

Analysis of deposit 1a =

An analysis of a deposit containing 75% Ni in sol as sulphate and 25% Fe as sulphate gave

[illegible] 12.7955 Wgt 0.1050 g.

[illegible] 12.7565

.0347

.02730 g Fe = 25.2+% Fe

1a [illegible] 16.3298 Total 12.7657
15.8610 Tugel 12.7565
.4688 .0092
.7
1.3 1/4 Fe .00644 Fe

.4688) .0064,40.00 (
4688
17520
14064

Sp. G. $NiSO_4$ sol 1060 @ 25 °C
20 g $NiSO_4$ per 200 cc H_2O

Cathode 2 3/4 long X 5/8 wide

= 2.750 X .622 X 2 sides
.622
5500
5500
16500
1.710500

1.71
2
3.42) .1462 amp per □ in
.500
342
1580
1368
2120
2052
680

No.	Solution used Nickel Sulphate Gram Sulphate 200 cc H_2O	No of Cathode	Anode used	Thickness before Plating	Thickness after Plating	Thickness of Fe	Current in amps when it commences to fail	Volts
8	20g Ni 1/4g Fe	18	Ni	.0325	.0363	.0019	.5	
9	20g Ni 1/2g Fe	51	Ni	.0327			.5	
0	20g Ni 1g Fe	20	Ni	.0328	.0344		.5	
1	20g Ni 2g Fe	21	Ni	.0327				
2	20g Ni 3g Fe	22	Ni	.0326				
3	20g Ni 4g Fe	23	Ni	.0329				
4	20g Ni 5g Fe	24	Ni	.0324				
5	20g Ni 6g Fe	25	Ni	.0327				
6	20g Ni 7g Fe	26	Ni	.0323				
7	20g Ni 8g Fe	27	Ni	.0324				
8	20g Ni 9g Fe	28	Ni	.0327				
9	20g Ni 10g Fe	29	Ni	.0324				
0	20g Ni 11g Fe	30	Ni	.0335				
1	20g Ni 12g Fe	31	Ni	.0335				
2	20g Ni 13g Fe	32	Ni					
3	20g Ni 14g Fe	33	Ni					
4	20g Ni 15g Fe	34	Ni					

No of Sol	Sol. amp. Nickel ammonium sulphate 200 + 200 cc H_2O	No of Cathode	anode used	Coulpts	Coulpts after flashing	Thickness of plate	Current in Amps
39	Straight Neutral	39	Ni	.0338			.5.
40	1/2 cc 10% H_2SO_4	40	Ni	.0334			.5
41	1 cc 10% H_2SO_4	41	Ni	.0331			.5
42	2 cc 10% H_2SO_4	42	Ni	.0330			.5
43	3 cc 10% H_2SO_4	43	Ni	.0330			.5
44	4 cc 10% H_2SO_4	44	Ni	.0337			.5
39	Same as 39	52	Ni	.0321			
39 started 10.00 AM		Read at 6.00 PM stopped 10.00 started 8.00					
45	2 hrs started then [illegible]						
46	No Acid	46	Ni	.0331			
47	1/2 cc 10% H_2SO_4	47	Ni	.0328			
48	1 cc 10% H_2SO_4	48	Ni	.0334			
46 47 48 started 11.00 AM.							

40, 41, 42, 43 Started 6 P.M. 22nd stopped at 10.00 4 hrs
Started again 23rd at 8.00 A.M. Total = 8 6 hrs

39 Started 23rd at 10.00 AM.

46 ~~47~~, 48, Started 11.00 AM 23rd
~~44~~

49. Started 4.00 P.M. 23rd in sol #44

45 Started at 11.00 AM 20th

Result of Calipers at 4.30 24th

		original	diff	one side
40	.0563	.0334	.0229	.0118
41	.0606	.0331	.0275	.0137
42	.0556	.0330	.0226	.0113
43	.0560	.0330	.0230	.0115
46	.0580	.0331	.0249	.0124
47	.0600	.0328	.0272	.0136
48	.0582	.0334	.0248	0124

49 .0326 .0360
50 .0325

49 – 50 Started 24 5.30 P.M. Both Peeled at 7.30
49 20g [illegible]
50 " " 4 " " " " " 1/2 g. " " "

5.6. Started 8.30 AM. 25th
#5 20g $PbSO_4$ 200cc H_2O 2cc 10% [illegible]
#6 " " " " " " " " "

#5 .0330
6 .0331

Calipers at 8.30 25th AM.

40	.064	.0334	.0306	15.3
41	.070 rough	.0331	.0369	18.4
42	.071 rough	.0330	.0380	19.0
43	.0655	.0330	.0325	16.2
46	.063	.0331	.0299	14.9
47	.068	.0328	.0352	17.6
48	.064	.0334	.0306	15.3

41, 42 very rough the rest quite rough

Caliper at 430 P.M. 25th.

40	.0713	.0334	.0329	.0379	.0189	all very rough
41	.0740	.0331	.0225	.0459	.0229	
42	.0750	.0330	.0226			
43	.0730	.0330	.0230			
5	.0385	.0330	.0385			smooth
6	.0406	.0331	.0406			smooth
46	.068	.0331				
47	.075	.0328				
48	.069	.0334				

Caliper at 8.30 26th

40	.0818	.0334				very rough
41	.0874	.0331				
42	.0885	.0330				
43	.0822	.0330				smoother
5	.0532	.0330				getting rough
6	.0533	.0331				getting rough
46	.0781	.0331				smoother
47	.080	.0328				very rough
48	.076	.0334				

40, 41, 42, 43 taken off at Noon July 26 too rough —

When starting the Nickel Sulfate series 20g $NiSO_4$ 200cc H_2O + 0 H_2SO_4 1/2 H_2SO_4 and 1 cc H_2SO_4 10% Sol. they plate green for a while about 1 hour or less then they plate good while the 20g $NiSO_4$ 200cc H_2O + 2 cc 10% H_2SO_4 plates good from the start. While the same series using the same quantity of Nickel ammon Sulfate and H_2SO_4 all plate good in the beginning.

#60	duplicate of #	46 in and				Started July 26 3.00 P.M.
61	"	"	"	47	1/2 cc 10%	
62	"	"	"	48	1 cc 10%	
63	"	"	"	5	2 cc 10%	

60 = .0336
61 = .0326
62 = .0324
63 = .0337

Calipers 430 P.M. 26th.

46 = .0815	.0331	.0484	.0242
47 = .0838	.0328	.0510	.0255
48 = .0780	.0334	.0446	.0223

Calipers 8.30 A.M. 27th

46 = .0890	.0331	.0559	.0279
47 = .0965	.0328	.0637	.0318
48 = .0850	.0334	.0516	.0258
5 .0642	.0330	.0312	.0156
6 .0665	.0331	.0334	.0167
60 .0466	.0336	.0120	.0060
? 61 .0385	.0326	?.0059	.00028
62 .0445	.0324	.0121	.0060
63 .0445	.0337	.0108	.0054

Aug. 2, 1912.

Experiment on fusible alloys for Phonographic Records.

The following samples were made using the parts by weight

No.	Tin	Lead	Cad.	Bi
13	8	8	0	2
14	9	9	0	3
15	8	8	0	4
16	5	5	0	5
17	4	8	0	8
18	10	6	0	6
19	3	5	0	8
20	4	8	3	15
21	2.950	5.170	2.240	10.500

All these were heated to their melting points and poured upon a mounted wax. 10° to 20° better than the melting point of the alloy this ~~for~~ found did not give a full impression However I tried one by filling on the alloy and heating the mounted and alloy to the melting point Same result as the preceding

Aug. 12, 12.

Fusable Alloy Samples
all Alloy samples in #2 bulbs and
Chem Room

25

Number	Tin grams	Lead grams	Cad. grams	Bismuth grams	Tellurium grams	Thallium grams	Antimony grams	Mercury grams
.25	100	100	—	—	—	—	—	—
.26	150	100	—	—	—	—	—	—
.27	150	75	—	—	—	—	—	—
.28	150	50	—	—	—	—	—	—
.29	—	180	—	20	—	—	40	—
.30	80	80	40.	40	—	—	—	—
.31	—	80	80	40	—	—	—	—
.32	—	150	—	100	—	—	—	—
33	20	20	—	40	—	—	—	200
34	~~10~~	~~10~~			5	—		
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								

Experiment on Record Material #2913

Distilling of asphalts residual products at to drive off the volatile matter and leaving a mass suitably hard enough for record material

(1.)

1st Parolyte was heated for 1/2 hour from 550°F. to 600°F. nothing distilled off up to this point. Sample #1 was a little of this Parolyte taken out of the pot to see if the heating had caused any change. 100 g used

(2)

Cleaning Sol for Gold Mach.

#1 sol 3500 cc Water
+100 cc 15% KCy

#2 50 cc H_2O_2 3%.

Sulphuric Acid for Smith
9/25/12

For 2 - 2½ liter Acid bottles use
800 cc H_2O to reduce from 1300° to 1275

For 1 bot 2½ liter Acid use cc
H_2O to reduce from 1300° to 1250

Nov. 1/12

Experiment on colouring Plaster Paris Black or dark Blue

No of Sample	Grams Plaster Paris	Grams Lamp Black
1	50 g	1 g
2	50 g	2 g
3	50 g	3 g
4	50 g	4 g

The Lamp Black was thoroughly mixed with the dry Plaster Paris & then water added and mixed so that it would just flow when poured into moulds 2" X 2" X 3/8"

5 Plaster Paris mixed with knife point of Heller and Mertz Fast Blue

6 Plaster Paris mixed with knife point of Heller & Mertz Methyl Blue B.B.

7 Plaster Paris mixed with knife point Heller & Mertz Nigrosene B.B.

8 Plaster Paris mixed with knife point Heller & Mertz Pat. Blue

9 Plaster of Paris mixed with 2 knife points of Iron Ferrocyanide (Prussian Blue)

10 Plaster Paris 50 g Prussian Blue 1 g

11 Plaster Paris 50 g Prussian Blue 4 g

Nov. 21, 1912

Solution to coat inside of Blue Amberol Record Blacks.

350 cc Alcoholic Shellac (as used by fallen Mak
3.5 g Heller & Merz Negrosine E.H.
15 cc Acetone.

1/2 gal 1750 cc alcohol + 675 grams shellac
To this solution add 75 cc Acetone and 17.5 grams Heller & Merz Negrosine E.H. (note at bottom)
The negrosine does not dissolve so readily so it must be mixed with alcohol in a mortar.

Black Sol. for Records

Alcohol 200 cc
Shellac 12 g + 6 = 18
Lamp Black 6 g

(Note)
Better to take 1400 cc alcohol to 675 grams shellac dissolve in a warm place and the remaining 500 cc alcohol use to dissolve the Negrosine. add this to the above

Dec 4, 12

Experiment on dielectrics for the spiders used in plating disc records

#1 Acid Proof Paint.
#2 Shellac
#3 Celluloid dissolved in Amyl Acetate + Acetone
#4 Goodrich Rubber cement (comes off too easily) Good insulator
#5 " " " + Gilsonite
#6 " " " + Montan Wax
#7 " " " + Pure Cuban
#8 " " " + B.S.
~~#9 Balata + Gilsonite in Benzole~~
~~#10 " + Elaterite "~~
~~#11 " + Montan Wax "~~
~~#12 " + Cuban Asphalt "~~
~~#13 " + B.S. "~~
#14 Balata melted with Rosin
#15 " " " Montan Wax
#16 " " " Gilsonite
#17 " " " Cuban Asphalt
#18 " " " B.S.
#19 Glen Ridge Resin in Alcohol.
#20 Gilsonite in Benzole N.G.
#21 Elaterite in Benzole N.G.
#22 Cuban Asphalt in Benzole N.G.
#23 Montan Wax in Benzole N.G.

√24 Tetra Chloro Naphthalin in Benzole too soft.
√25 " " " melted — too soft
√26 Ozokerite in Benzole ~~Brittle~~ will not thread a slight break
√27 Rubber Cement
√28 #1 Varnish Hoffman
√29 Melted Cuban Asphalt Prime Brittle N.G.
√30 " Montan Wax Good
√31 " Gilsonite N.G. Brittle
√32 " Gilsonite N.G.
√33 Collophan Lquer from Aylsworth ~~N.G.~~ #.
√35 Vulcanizable rubber coating (sheet)
√34 " " N.G. dissolved in Benzole
√35 √ #333 Varnish (Hofmann)
√36 Gilsonite + Rubber cement in Benzole N.G.
√37 Burgundy Pitch 15g Gutta Percha 2g Good little too sticky
√38 Gilsonite 15g Gutta Percha 2g too Brittle
√39 Prime Cuban Asphalt 15g Gutta Percha too Brittle
√40 Montan Wax Gutta Percha 2g N.G.
√41 Rosin 15g Gutta Percha 3g ~~N.G.~~
√42 Tetra Chlor Naphthalin 15g Gutta Percha 2g N.G. too soft.

Remarks

38 Almost impossible to spread it over the metal surface (cools so quick) can just be spread on with a hot iron

40 Gutta Percha does not dissolve very readily

~~42 Gutta Percha dissolved them suddenly coagulated out~~

43

44

45

46

47 Beeswax & Rosin

OK
48 Burgundy Pitch 15g Gutta Percha 2g Prime Cuban Asphalt ½ gram. (melted)

OK
49 Rosin 15 grams Gutta Percha 2g Prime Cuban Asphalt ½ g. (melted)

50 Block Lab 20g Balata in " Benzole

51 Pyrolite from S. B. Co

52 Acid Proof Paint

53 5 grams Cuban Asphalt in " Benzole + 25 cc of 20g Block Balata in 100 cc Benzole 1-st sample 1g then successively added 1g Cuban Asphalt

54. Same as 53 except 7 grams Prime Cuban Asphalt

55 $12\frac{1}{2}$ cc of 20 g Block Balata in 100 Benzole + 10 g Soft Mexican Asphalt.

56 10 g Prime Cuban Asphalt + 2 g Balata Dissolved in Turps M.G. Large Sediment in the mixing showing that very little was dissolved —

20 a Gilsonite in Benzole + Balata
No proportion

20 c Gilsonite 15 g in Benzole + 15 cc 20 g Balata in 100 Benzole the clear part

a. Metzel Roof Paint (Good) dries very slow

b Black Asphaltum Mexican Varnish Works (Dries too slow)

P + B Paint (Good) dries exceedingly quick.

Jel = Jelatong Paint from Silver Lake

by Good Painted sample on flat slip exposed to the bath for 21 hours shows only a few slight spots, while the sound rod does not show any signs of attack (sound rod was dipped)

57 = Jelatong Paint 50 cc + 5 cc of 5 g Naphthalin in 25 cc Benzole

58 = Same as above except 15 cc of the Naphthalin Benzole sol. added

Black Coating for inside of Blue Amberol Records (Experiment.) Jan 3, 1913

Name of Dye	Benzine	Benzole	CCl_4	Turp
Nigrosine (Sol in Benzine) Merck	Not Totally	Sol.	Sol.	Insol
Deep Black Fast color #8236 Berlin Aniline Wks	Sol.	Sol.	Sol	Sol
H + M. Deep Black K.D.X. Conc	Insol	Insol	Insol	
" " Oil Black D. #247	Insol	Slightly Sol.	Insol	
" " Nigrosine B.B. Base	Sol.	Sol.	Insol	
" " " R	Insol.	Insol.	Insol	
" " " W.E.	Insol.	Insol.	Insol	
" " " B.B.	Insol.	Insol.	Insol	

Name	Benzine	Benzole	CCl_4	Turp
Aluminum Stearate	Partly Sol	Totally Sol	Totally Sol.	
Gum Kauri		Sol.	Sol.	
Shellac		Totally Sol.	Partly Sol	
Cresol Resin	Insol			Insol

Solubility of Record Celluloid

#1 Celluloid from record in Benzine

#2 Celluloid from record in Benzole

#3 Celluloid from record in CCl_4

#4 Celluloid from record in Turpentine.

Mixture #1
Cresol Resin 5 grams
Deep Black Fat. Color #8236 B.A. Wles. 1 gram
Benzole 50 CCm

No #2 Same as #1 same bottle
but added 1/2g. Dye = 1 1/2g Total.

#3 Same as #1 except added 1/2g
more dye making total of 2g dye

#4 Cresol Resin 10g
Deep Black Fat. Color 8236 1 g
Benzole 50 cc

5 Same as #4 except added 1/2g
more dye. total 1 1/2 g

6 Same as #4 except added 1/2g more
of the dye total 2g.

#7 Benzole 50cc + 2g Dye #8236

#8 CCl4 50cc + 2g Dye #8236

#9 Gilsonite in Benzole + #8236 Dye
no proportion -

#10 Gilsonite in Benzene + #8236 Dye
no proportion

#11 Gilsonite 5g Benzole 50cc
Dye #8236 1/2 g.

12 Same as #11 except added 1/2g
more #8236 Dye total 1g.

Füll Material für Flaschen Wolgrün

30 g Eisenvitriol wurden aufgelöst in 280 CCm Wasser und dazu 170 g Zink Oxyd dann auf Rückstand 100 g Wasser noch dazu gesetzt.

Ich habe es besser das Eisenvitriol zu zuerst lösen und dann erst das nötige quantum von Zink Oxyd zu zugeben.

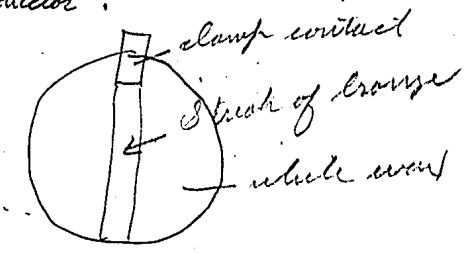
60 — 600 — 340

Ammonia beschleunigt die Lösung des Eisenvitriol

Für 5 lb.

150 Eisenvitriol	1500 Wasser	850 Zink Oxyd
3	3	3
450	4500	2550
900	9000	5100
	2 gal 3 pints	

Experiment to plate upon wax and other none conducting materials by using bronzes as a conductor.



The bronze streak to be plated with copper or other metal in a suitable plating bath

#1 A streak was made with a dilute sol of Shellac in alcohol then before it dried was brushed over with White Tin Bronze the surplus then brushed off.

#2 A streak made by rubbing cement copper on the wax.

#3 Same as #1 except used F. W. Devoe #3 Pale Gold Flake Price 1.50 per lb.

Different blends of Bronzes were used in order to see which one conducts the best. They were all painted on a piece of white wax using a sol. of alcoholic Shellac Sp. G. 0,825 allowed to dry 5 minutes then put up a regular copper plating bath (albert Hurtz) and the current pointed for 1/2 min then looked at returned to the bath current on another 1/2 minute ect. All trials 200 M.A. Rate

#1 Pale Gold Flora #3 from F. W. Devoe & C. T. Raynolds.
In 1/2 Min Third Strick not covered totally covered in 1 min. Price 1.50 lb

2 Pale Gold #800 same firm as #1 Coated in 1 min but not as clean as #1 Flashes over quit quick but then went more slow.

3 White Tin Bronze. Covered in 1/2 min with a very thin flash to the end of all the strokes but then flaked very thinder too coarse.

4 Fine #1000 completely flashed over in 1/2 min plates good.

Gold on the bronzes

All samples from F.W. Pevoc & C.T. Raynolds,
Gave to Mr. Edison

1 consists of 16 grams Pale Gold Flora #3 from Pevoc in 10 cc Alcoholic Shellac containing 2.6 grams shellac per 100 cc Denatured alcohol Sp. G. 0,825. when the alcohol is Sp. G. 0.808. 1,50 lb

2 consists of 10 grams Pale Gold #800 in 10 cc Alcoholic Shellac same as in # 1 1.25 lb

3 consists of 7 grams Extra Deep Gold Leaf in 10 cc Alcoholic Shellac same as in #1 5,00 lb

4 consists of Rich Gold Lining Extra Fine 5 g in 10 cc Alcoholic Shellac same as in #1 6,00 lb

5 consists of 4 g Pale Gold Lining Extra Fine in 10 cc Alcoholic Shellac same as in # 1 6,00 lb

Degrees of Fineness under the Microscope by comparison

1st Rich Gold Lining Extra Fine # 5
2nd Pale Gold Lining Extra Fine # 4
3rd Extra Deep Gold Leaf. # 3
4th Pale Gold # 800 # 2
5th Pale Gold Flora # 3 # 1
Equal to # 3 is Light Blue Patent Bronze

Jelutong Dissolved in Benzole

25 g Jelutong in 500 cc Benzole

Viscosity of #344 Varnish

25 cc Takes 1 min 10 sec to flow out of the Pipette @ 76° F.

Jelutong Paint. Formula
36 Gallons Varnish

Jelutong	28 lbs 14 g.	13,076 g
Benzole	120 liters	120 000 cc
Gilsonite	36 lbs.	16,308 g

Add the benzole to the dry Jelutong put on hot plate (low heat) to let it dissolve for 24 hours ~~letting it stand~~ stirring every 10 minutes remove and let settle 1 hour draw off the clear liquor which again put on hot plate then add the Gilsonite finely ground stir every 10 minutes for 24 hours.

Formula to make 1 gal

Jelutong (Dried)	363 grams	390
Benzole 30% Water Mihil	3,333 cc	3600
Gilsonite Powdered	453 g	489

Total Weight 11 9996
Weight Glass 9.5177
Jelutong 2.4819

2.4819 — .0250
100 — X

Total Weight 11,9996
" " 11,9746
.0250

1.0 % Moisture in Jelutong

2,4819) 025,000 (1.0
2 4 8 1 9
1 8 1 0

1% Moisture in the Jelutong after drying 27 hours at about 150° C

Total =	19. 4400	19.4400
Glass =	12,1645	19.1700
Jelutong =	7,2755	.2700

7,2755 — .2700
100 — X

7,2755) 2700.00 (37.00

List of Aniline Dyes from Heller & Merz.

Soluble in Alcohol

Blues.

Alkali Blue 3R
Cotton Blue S.B.X. Conc.
Methyl Blue B.B.X.
Azurine
Blue B. Alc. Sol.
Alkali Blue C.I.
Victoria Blue Base
Pat. Blue A. Conc
Victoria Blue 4.R.
Methyl Blue B.B.

Blacks

Nigrosine W.E.
Nigrosine B.B, Base
Pat. Black Fat color # (# 236). Berlin Aniline ... also sol. in Benzole.
Aniline Black (Mersch) Benzine Sol.
Oil Black sol. in alcs also.

Violet

Crystal Violet 6.B.
Violet Base
Methyl Violet 3.B.P.
Acid Violet 4B.L.M. Conc.

Red

Orange V
Acid Orange #C 25441
Orange 2R.
Acid Scarlet M.O.V. Slightly Sol.
Brome 4A
Rhodamine Base
Brome J Sparingly sol.
Acid Magenta
Rhodamine R.X.
Safranine Base
Fuchsine Base
Rhodamine B.X.
Safranine G.E.F.X.
Fuchsine R.T.

Yellow & Brown

Chrysoidine R
Phosphene 2nds
Chrysoidine Base
Resorcine B ... L.X. moderately sol.
Auramine O Base
Yellow 44P. Conc. mod. Sol.
Chrysoidine Y. more Orange color.
Chrysoidine R. Base
Resorcine Brown O.B.
Phosphine Y.Y.

Auramine O.O. B. Conc
Chrom. Yellow W. Conc. Sparingly
Phenol. Brown E.T.
Manking Yellow Y.
Phenol. Brown A.T. Conc.
Bis. Brown Y. Brill.
Manking yellow R.
Bis. Brown 2. R.X.

Greens

Green H. Base moderately sol.
Acid Green B.B.X.
Green M.
Green R.
Acid Green C. G.X.

Feb. 4th 1913

Experiment to coat Graphite with a metallic coating of Silver by means of reduction.

1st Tried to reduce Ammoniacal Silver Solution with the following reducing agents.

Formaldehyd (Reduces) Phenylhydrazine
Aldehyde (Nil.)
Glucose (Reduces) (best)
Grape Sugar
Oil Cloves (Reduces)
Eugenol (Reduces)
Iso Eugenol (Reduces)
Hydroxylamine
" Hydrochloride (would form Ag Cl)
Hydrazine Sulphate (Reduces extremely rapid)
Mannit Sugar (Reduces but with heat)

Graphite was then tried by the following solutions and found to be covered fairly well last sample good.

12 g $AgNO_3$ + 1000 cc H_2O + NH_4OH until free. first dissolves, to this was added 5 cc Formaldehyd 40% + 250 cc H_2O.
(Glycerine also reduces requires to be warm.

this gave a fairly good reduction on the graphite.

10% Sol $AgNO_3$ 200cc + NH_4OH until prec. just dissolves. + 200cc of 10% KOH then add NH_4OH until prec. again just dissolves. To reduce the graphite two put into a test tube and 6 cc H_2O added then 4cc Ammoniacal Silver solution as above and 2cc 5% Glucose Solution. reduced cold in about 10 minutes. washed the graphite with H_2O and dried at a gentle heat.

5g $AgNO_3$ + 50cc H_2O
5g KOH + 50cc H_2O
$2\frac{1}{2}$ g Glucose + 50cc H_2O

#1 Standard 6cc H_2O
4cc Combined Silver = Best
2cc Glucose

Combined Silver = 2cc $AgNO_3$ + NH_4OH + KOH + NH_4OH

#2 6 H_2O
4. Comb. Silver Good
1 Glucose

#3 12 H_2O
4 Silver Comb. Not all covered
2 Glucose

#4 6 H_2O
2 Silver Not all covered
1 KOH
2 glucose

#5 4 Silver Comb. + 6 H_2O Best looks same as #1
2 Glucose

#6 6. H_2O
1. Silver Not all covered
1 KOH
2 Glucose

#7 6 H_2O
2 Silver Too much reduced silver thrown down with the graphite.
4 KOH
2 glucose

Also tried the various Formaldehyd solutions for reduction.
All these reductions on graphite rub off or the covered particles are big rubbing on the record covered with graphite from the particles not, or only partly covered.

I also tried ~~it~~ to cover graphite by moistening it with 10, 20, 30, 40% $AgNO_3$ and then reducing by heat.

I also tried to make colloidal silver by ~~two~~ three methods 1st the Carey Lea Method which consists of mixing
200 cc Silver Nitrat 20%
200 cc Sigmatter Soltz 20%
800 cc Wasser
Zu diesem wird gegossen tropfenweise
107 cc Eisen Vitriol 30%
200 cc Sigmatter Soltz 20%
800 cc Wasser.

No 2 <u>200 cc Silber Nitrat. 10%</u>

200 cc Eisen Vitriol 30%
250 cc Natrium Citrat 40%
50 cc Natrium Carbonat 10%

Auf zu waschen mit 5% Natrium Citrat Lösung.

#3 Zwei Pelm von Silber wurden in H_2O eingetaucht und ein Strom von 2 Ampere hindurch geleitet.

Das ganze wurde ein wenig mal filtriert und die feine Teilchen zuerst filtriert und auf Porzellan Nickel das filtrierte Teil wurde verwendet.

Die Teilchen sind in Lösung gelangt mit Alkohol und aufgestrichen auf wax oder auf wax löst sich zum Teil und trotz dem feinen Gleichen entsteht mikroskopische Klumpen auf dem trocken trocknen löst sich sich feinen Filmen mit dem natürlichen Silber glanz. Das wie Gleichen löst sich gut platinieren

contact 2 Teil in welchem die Gleichen die Form verwandert auf auf das Band
3 Teil platiniert

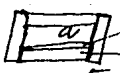
Durch fortwährendes verdunsten kommend die Wasser unter Spangel mit weichem Wasser. Abspülung ob sich nun wässrige Lösung wasser oder reine Alkoholische.

Es soll dies in mosser Spirgel artig sein. Dunstet beim es nicht in pulver form auf einen Reiber gestreichen werden.

Ich habe versuchsweise gemischt mit glucose Dextrin zuckern u.s.w. zu benutzen.

Ich probierte kupfer mit Hydrazium Sulfat Hydroxylamin Hydrofluorat und zucker zu reduzieren auf wachsen und trocknen.

Ich probierte volgendes.



a. Wog b. fein gemischtes metall (Gold. Silber) c Mortar. beim zerreiben heiß und beim pressen.

Silber Carbonat gemischt aus K_2CO_3 + $AgNO_3$ dieses wird gemischt in K. Ag_2CO_3 erhitzt zu 200°C und wird gemischt in H. Letzteres, wenn feiner aber bleibt pulver zu grob. Temp. der reduction 110°C.

Ich habe probiert Ag_2S auf dem selben weise zu grob.

$AgNO_3$ + SO_2 ergab $AgSO_2$ und dieses durch kochen zu Ag zu reduzieren nicht vollständig. Köpfe entstehen wenden filterg.

O.K.

Silber Carbonat entweder als polieren oder fein vergangen zu Ag_2O Feuchtigkeit oder ganz.

Silber Sulfit auf $AgNO_3$ + SO_2 direkt mit NH_3 + aldehyd zu Ag reduziert.

Kolloidales Silber

200 cc	Salpetersaures Silber	10%
210 cc	Eisenoxydul Sulfat.	30%
280 cc	Zitronensaures Natrium	40%
50 cc	Kohlensaures Natrium.	10%
107 cc	Eisenoxydul Sulfat	30%
200 cc	Magnesium Salz	20%
800 cc	H2O offen	
200 cc	Salpetersaures Silber	10%
200 cc	Magnesium Salz	20%
800	H2O offen	

Kolloidales Silber.

Man verreibt Eiweiss mit Argentum in H S Säure bei 100° C und löst auf Zusatz von wässriger NH3 Lösung hat auch Albumin gewonnen.

Silber Oxyd gewinnt man aus einer Lg. im Stickstoffsauren Kalium bei Zusatz von elektrolytisch Argentum als positivem Pol.

Einfach wenn Silber Lösung Zusatz erhält Infusion wird fein gut auf Zusatz Zusatz

Argentum Nitricum fabricatis cum Aurum Cyanicum, quantum fortis praecipitatum cum Iodium fortis Multiligum.

Experimentatum cum Celluloid et Argentum praecipitatum cum Hydrogenium, Hydrargyrum Sulfuratum, Formaldehyd ab Sparatum Aethyl Alkohol Iodum Argentum Nitricum Ammonium Oxydatum

Argentum et Bromum Iodum praecipitatum Emulsionis est fabricatum cum Gelatine Kochen zum Aufquellen.

Wenn addiert zu den factor .07918
die cc H_2SO_4 1/2 Normal welche man
benutzt. und from der summa subtrahiert
man der Log. des gewicht der gebrauchten
Li OH zum titrazion.
fur KOH benutzt man den factor .44793

10 % Ag NO_3
10 % Na OH
5 % Ammonia
100 cc Ag NO_3 Sol + NH_3 until clear
+ 100 cc Na OH sol + NH_3 until opalescence
+ 300 cc H_2O + 100 cc Ammonia sol

Formula #1
For 8 records take double quantities
10 g Ag NO_3 in 50 cc H_2O + NH_3
until precipitate clears then add
drop by drop a sol of Ag NO_3 1 to 5
until there is a permanent opalescence
filter —

20 g Na K Tartrate and 20 g Rock
Candy dissolved in 200 cc H_2O
+ 4 g Ag NO_3 in 20 cc H_2O boiled
for 1/2 hour and filtered

For use use 1 to 1

Sol. # 3 for Sticking Celluloid to Powder Blank consists of 200 cc Amyl Acetate + 75g Camphor.

(Regular)

Sol # 1 for Sticking Celluloid to Powder Blanks made April 8 9.00 o'clock Morning. consists of 2000 cc Amyl Acetate + 500 grams Camphor or 25g Camphor per 100 cc Amyl Acetate 25%

Sp. G. @ 25° C = 0.880
Sp. G @ 25° C of Amyl Acetate = 0.858

10 lbs Camphor
5 gals Amyl Acetate conc. Each

500 cc Amyl Acetate
125 cc Camphor } made 640 cc Sol.

2000 cc Amyl Acetate
500 Camphor } will make 2560 cc Sol.

For 5 gals.
14,800 ~~gr~~ cc Amyl Acetate - 4 gal
3,700 grams Camphor 37 lbs.

Plating Solution Trisalyt
from Roseler & Hasslacher Chemical Co.

Copper

Copper Trisalyt. 10 lbs 6 2/5 g
H_2O cold 25 gals 1 gal

Temp. of bath 15°-20° C

V at 6" anode distance for Iron 3V for Zinc 3½ V
Every of V for each 2" anode distance 0.30 V
When anodes become covered with green mud add
Na Cy. 12 g%
The quantity of bright carb. of measured to silver
For iron and lead goods also add about 4½ lbs
Na Sulphite (dry) and 2¼ lbs Na_2CO_3 (dry) is
of advantage

Brass same conditions as for Copper
except for each 2" anode distance 0.25 V
Copper Trisalyt 11 lbs
Zinc " 5½ "
H_2O Cold
25% NH_3 according to stock wanted 1/2 to 1½ lbs

Bronze Baths

Copper trisalt	14 lbs.
Zinc "	4 2/3 lbs
H_2O cold	25 gal.
Aqua Ammonia 25%	7 oz

Temp 15–20° C 2.9 V for iron 3.25 for Zinc

anode distance for each 2" added 0.10 V

Anodes soft cast brass 85 Electrolytic brass 15 zinc

Bath also requires the Na Cy. if covered with mud. by the proportions all shades can be had.

Higher Voltage gives darker shades lower lighter shades size of anodes equal to the size of the goods.

Zinc Bath

Zinc trisalt	13 lbs
H_2O cold	25 gals

Temp. 15–20° C

for getting cast Iron 4½ lbs Na Sulphate 2¼ lbs Na_2CO_3 and 1⅓ lbs NH_3 (0.910)

Voltage same as for copper.

KCy for mud

Gold Bath Light Plating

Gold Trisalt 49% Fine Gold	1.4 oz
Na Phosphate C.P.	8.4 oz
Na Cy 129%	1.6
H_2O	5 gal

Temp 120–160

V. at 6" 3 V Change for 2" added 0.1 V

Heavy Plating

Gold Trisalt	2.4 oz
Na Phosphate	6.7
Na Cy	1.6
H_2O	5 gal

Temp. 120–140° F V at 6" 2.5

Change for 2" 0.15

Anodes 1/3 larger than goods

Anodes Gold, Platinum or carbon in fine sizes.

for carbon the surface area should be 1½ times larger than the goods and V. increased to 3 V

Na Cy 129% added if anodes become dark

High voltage darks Low V. Light.

For fine working increase gold to 2.8 = 7 oz Trisalt

This can be used for coloured plating with gains of 1–2 oz Na Cy are added

Adding Silver Trisalt Green Gold and Silver and Copper Trisalt pale gold

Zyglo

Silver Fusaly (50% Fine Silver)	13.5 oz
H_2O	5 gal
Temp	60-70° F
V. at 6 in	2.
Change per cm 2"	.0.3
Na Cy if muddy	
2-5 oz Na Cy added for boil process	
Temp about 190° F	

Heavy white same as above

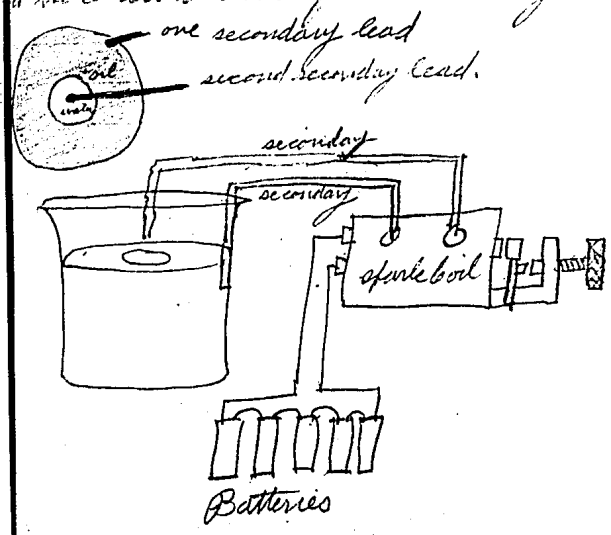
Fusaly Silver	2 lbs 2 oz
H_2O	5 gal
Temp	60-70° F
V. at 6"	1.5 V
Change per cm 2"	0.5 V

Method for precip Nickel with Methylglyoxim

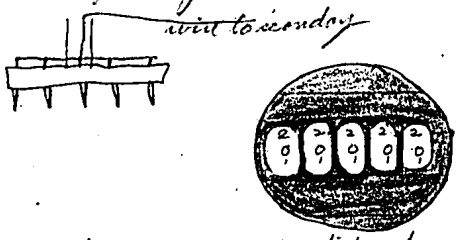
April. 9, 15

Experiment to get rid of dust and greasy particles on the surface of water and plating baths.

No 1 A spark coil of the jump spark variety was connected up and one lead of the secondary dipped into the solution while the other lead was held over the solution of water upon which was poured some oil it was found that in the vicinity of the lead above the surface of the oil that the oil displaced itself in a circle leaving as we may say a hole in the oil film covering.



An Antenna of this form gave a result on the surface of the oil like this

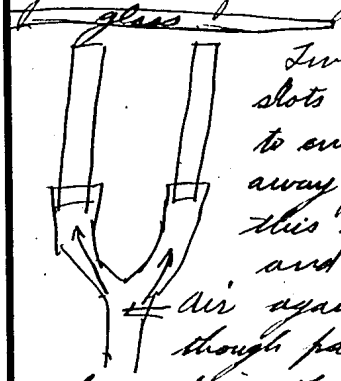


1 antenna 2 water dispersed away from the antenna
blue = oil

This method when applying numerous points causes a constant circulation of the film surface in the following direction

Only a small amount of oil is found circulating in the center while most of the oil remains in the outer ring
It is no good for dust does not make it move unless oil is present

#2 I tried to blow away the dust by the two following methods.



Two pipes with small slots extending from end to end to blow the dust away from between them this set up a circulation and the dust came in again at the ends even though partitioned off with a large piece of glass

#3 I tried the effect of a rose burner shaped piece of metal

The air allowed to escape on account of very loose threads. this did not keep the dust away from the center.

I also tried the following.

Air blown through a tube from under the surface of the liquid

I also tried to keep out dust by means of a silk partition entirely surrounding the disc this seems quite promising but the silk vehicle I tried was too coarse a mesh.

A Piece of Gauze Silk takes off the dust fairly well.

A Piece of parrafined paper seems to work fair.

A piece of roughened celluloid poor.

I also tried a vacuum suction through a close mouthpiece but this did not work

Experiment to find a Solvent for Acetylcellulose which will not dissolve Celluloid. April 17-13

X = Celluloid Tried in a solvent for Acetyl Cellulose which does not dissolve Celluloid

No.	Name of Solvent	Celluloid	Acetyl Cellulose	X	Remarks
1	Alcohol (Ethyl)	Sol			Dissolves takes quite time
2	Alcohol (Methyl)	Sol.			Dissolves Swells totally sol.
3	Acetal	Sol.			Swells totally sol.
4	Aldehyde	Sol.			Swells totally sol.
5	Acetophenone	Sol.			Swells totally sol.
6	Carbon Di Chloride	Insol.			
7	Carbon Tetra Chloride	Sol			Softens does not dissolve
8	Carbon Di Sulphide	Sol			Softens does not swell much
9	Ether	Sol			Swells Softens 3X
10	Ether Benzoic	Sol.			Swells Softens
11	Ethyl Oxalate	Insol.	Insol.		
12	Ethyl Penta Chlor	Insol.	Sol		
13	" Tetra "	Insol.			

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continued

No.	Name of Solvent	Celluloid	Acetyl Cellulose	X	Remarks
14	Ethylen Per Chlor	Insol.	Insol.		
15	" Tri "	Insol.	Insol.		
16	Acetylene Tetra Chloride	Insol.	Sol.		Dissolves a fair film.
17	Ethylene Chloride	Sol°			Softens does not swell much
18	" Di Chlor	Insol.	Sol.		Dissolves a little.
19	Alcohol Amylic	Insol.			
20	Propyl Valeranic	Sol°			Seems to dissolve 1 ingredient
21	" Formic	Sol.			Swells Becomes gelatinous
22	Toluene	Sol°			Swells Totally Sol.
23	Pyridine	Sol.			Swells Totally Sol.
24	Terebene				
25	Xylol	Sol.			Softens probably dissolves camphor.
26	Xylidin				
27	Iso Butyl Xylol				
28					
29					
30					
31					

135

136

Put a little solvent on watch glass and evaporated

6

7

8 Carbon Disulfide Trace of camphor

9 Ether dissolves out the Camphor.

10 Ether Benzoic Dissolves a trace of celluloide

11

12

13

14

15

16

17 Ethylene Chloride dissolves something (Camphor)

18

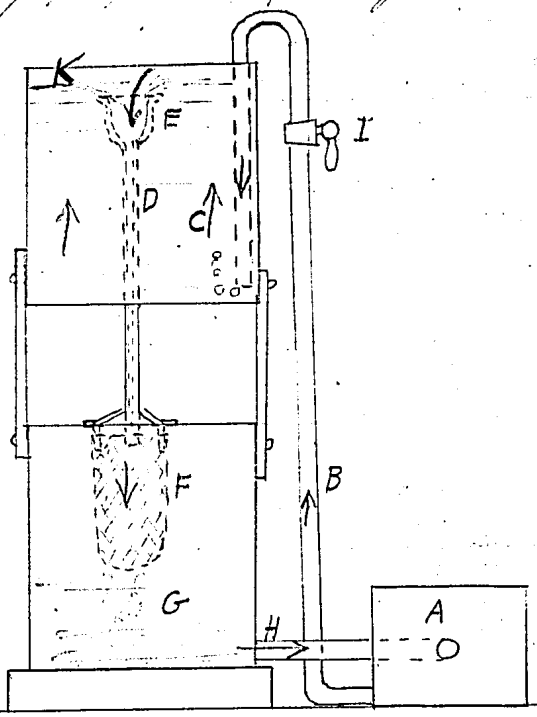
19 ~~Ur~~

20 Propyl Valerianic Resides Trace of ~~cellulo~~ cellulose

21 Toluene Trace of Camphor

22

Method for Filtering Circulating and Keeping free from dust Plating Baths. April 15, [illegible]



The liquid is forced by the centrifugal pump A through the pipe B into the Bath C. The Cover [illegible] on the bath C to the left [illegible] with the pipe D (with the Thistle Tube foam E) into the filter Bag F which [illegible] drifting from the filter into the [illegible] of liquid.

All dust on the surface K of the liquid by the suction caused from the flow of liquid through the pipe D is attracted to the Thistle Tube E and keeps the surface K free from dust.

Dixons #.097 Graphite
Purified by Acid.

1/2 of a 2 liter beaker of .097 is covered to 1 inch over the mark where the graphite came with C.P. Hydrochloric Acid This is put on the hot plate covered with a watch glass and occasionally stirred time 3 hours
Then it is poured into a battery jar diluted with water and let stand 2 hours then syphon off the clear liquid (it does not settle more than 1/4 of the distance from the top.) this was done 6 times in order to have it free as possible from acid so as not to attack the linen when filtering.

Next it is filtered through a double filter 1 of paper 1 the other of linen, linen to be the one in contact with the graphite washed with distilled water until Ag NO_3 shows only a slight opalescence

Silver Mud

Took 2.0000 g Silver mud and heated to [illegible] in a crucible

9.9441 Total
7.9441 Crucible
2.0000 g Mud

9.9441 Total
9.3400 Wgt.
.5041 loss after heating

25.2% loss on sulphuric acid after heating

2.0000) 50411 00.00 (
4000
10410
[illegible]
[illegible]
[illegible]
10000

Heated mud dissolved in HNO_3 boiled and filtered into a little sulphuric acid diluted from the sulphuric [illegible] formed when the [illegible] Silver and Sodium Sulphate. Filtrate precipitated with [illegible]

Total = .8262
Filter = 0.2863
.5399 Silver Chloride in the mud

= .4063 Metallic Silver or 20.27 % [illegible] Silver

26.94 % Ag Cl

2,0000).5399.0000 (
4 0000
1399 00
1200 00
199 000
180 000
19000
18000

2.0000
.5041
1,4959.) .5399.0000 (= 36.09 %
44877
91150
89754
13760

36.09 %

silver in the roasted mud as chloride
= 27.15 % Metallic Silver

143.4 Ag Cl 107.9 Ag

143.4 : 107.9 :: 36.09 : X

107.9
36.09
9711
6474
3237
3894.1.1

107.9
269.4 Ag Cl
4316
9711
6474
2158
29068 26 (143.4
28 65
3882
2868
10146
10038
20.27 % Ag in Mud

143.4) 3894.1.1 (27.15 %
2868
10261
10038
2231
1434
7970

Silver in roasted Mud

5g [illegible] residue [illegible] with dil. [illegible] filtered [illegible] filtrate [illegible] to dryness

Total weight = 37.30
beaker = 34.30
weight salts left dry = 3.00 (lb Trace of Silver)

Total weight = 36.20
beaker = 34.20
Residue left from 5g = 2.00

Residue treated with HNO_3 boiled to remove sulphur, filtered & weighed sulphur

Total weight =
of filter = .3310

2g roasted mud + 2g Chili Saltpeter + 2g Sodium Carbonate, Silver obtained 500 mg.

2.0000 g) 5000.0000 (2.5 %
4000
10000
10000
10000

After fusion leached out with water filtrate acidulated and non precipitated with Ammonia ferric filtered off and passed H_2S through filtrate (Trace of Lead)

Results of Screening
Black Powder & Wood Fibre
20g taken in each case

	Black Powder	Wood fibre
Remaining on 60 Mesh	0.5g	—
" " 100 Mesh	2.5g	7.5g
" " 150 Mesh	8.5g	7.5g
" " 200 Mesh	2.5g	2g
Thru — 200 Mesh	3.5g	2.5g

Reducing properties of [illegible]
from Bradshaw [illegible] and [illegible]
[illegible] with proper [illegible] with the
[illegible] results.

Reduces [illegible] from [illegible]
powder from [illegible] when
fused with [illegible].

Cobalt [illegible]
Co [illegible]

Reduces Nickelous [illegible] Ammonium [illegible]
to [illegible].

Silver Reduces [illegible] 2g [illegible]
Also [illegible] Ammonia [illegible] mirror.

Mercury Reduces [illegible]
to [illegible]? or an [illegible]?

Lead Reduces Lead Acetate to a
mirror

Reduces Copper in Ammonical Sol.
to a Nitro oxide Copper is deposited

Cadmium

Bismuth Reduces Bi Ammonical Sol.
Bi Tartrate [illegible] powder.

Arsenic

Mercury

Tin

Sol. [illegible] of [illegible] [illegible]
[illegible] Copper [illegible]
[illegible] Ammonia [illegible]
[illegible]

Nickel Tartrate + [illegible] [illegible]
Nickel [illegible] [illegible]
Nickel K Cyanid [illegible]
Nickel [illegible]
"
"

April. 21, 13.

Experiment to cover [illegible] with a coating of Ni by means of Hydrosulphite

Samples in 2 [illegible]

1	$Ni(OH)_2$ 5g.	Water 20cc		Hydros. 5 mg.		
2	"	"	"	"	"	10 [illegible]
3	"	"	"	"	"	25 [illegible]
4	"	"	"	"	"	50 [illegible]
5	"	"	"	"	"	100 [illegible]
6	"	"	"	"	"	500 [illegible]
7	"	"	"	"	"	1 gr.
8	"	"	"	"	"	5 [illegible]
9	"	"	"	"	"	8 [illegible]
10	"	"	"	"	"	10 [illegible]
11						
12						
13						

1 Nickel Oxalate dissolved in ammonia and then made nearly neutral with Oxalic Acid fine Mirror but together with a lot of black

3 Nickel, Cinchonine + Ammonia Prod. of a fine nearly [illegible]

4 Nickel Citrate N.G.

5 Nickel Citrate + Ammonia [illegible] of black

6. Nickel [illegible] N.G.

7 [illegible] N.G.

8 Nickel Citrate + Ammonia N.G.

9 Nickel Potassium Sulphate N. G.
+ Ammonia Co[illegible] Comes Easily
Co of Black.

10 Nickel Acetate Poor

11 Nickel Acetate + Ammonia
Poor

12 Nickel Chloride

13 Nickel Chloride + Ammonia

14 [illegible]

15 Nickel Nitrate + Ammonia

Festgeformte Nickel + Platinoxyd
mit Kreßfen + Bordeaux eingeschlossen
mit Kupfer und Nickel und Zinn
und Platinum.

7/ x = Silberfolienstreifen Nickel Oxyd Ammoniak
y =
z =

#1 x = 50 y = 15 z = 5
z wird verdünnt zu 25cc auf das Ni(OH)2 zugegeben
abgeschlossen dann 50 x dazu und 5 g z
geschickt dann 5 g z wieder zugekocht u.s.w.
bis 15 g y zubereitet worden.

#2 das selbe wie #1 aber kocht.

Stannous Chloride Sol

3000 cc H_2O

50 g Stannous Chloride

10 cc ad. lib. HCl.

Filter Preserve Filter.

Experiment on Backing for Records

June 20, 13.

This experiment consists of making compositions to be used as backing on the plated record [illegible] on the smooth side in order to see if it is [illegible] in order to avoid the [illegible]

#2

#3 2 g [illegible] 1 ÷ 1½ [illegible] and [illegible] Water.

[illegible]
$PbCl_2$ = 17 g
Chloride = 18 g } very coarse

[illegible] Same as [illegible] 3 cc [illegible] and ½

[illegible] Same as [illegible] 3 cc [illegible] and ½

6 Same as [illegible] 3 cc [illegible]

7 2 g ZnO + 1½ cc [illegible]

8 Same as #7 [illegible] 2 cc

9 Same as #7 [illegible] 2½ cc

10 Same as [illegible]

(Best two) 1st. 20 g ZnO + 12 cc U.S.P. H_3PO_4 Phos acid 4 cc H_2O

2nd
ZnO 20 g + 15 cc U.S.P. H_3PO_4 in water

Chloride Sets
[illegible] Various Proportions, [illegible] the following [illegible]

2 g	ZnO	+ 2 cc	Chloride	45 %
2 g	" "	+ 2 cc	"	35 %
2 g	ZnO	+ 2 cc	"	35 %
2 g	ZnO	+ 2 cc	"	55 %
2 g	ZnO	+ 1½ cc	"	45 %
2 g	ZnO	+ 1½ cc	"	55 % Qut.

Data for Dentists for 10" Disc.

20 g [illegible] 85% H_3PO_4, 14 cc H_2O will give [illegible] discs 2.25" diam. X ½" thick

225 .7854
506
1125 [illegible]
450 [illegible]
[illegible] [illegible]

8) 3.974 (.497 cu in say, 5 cu in
32
77
72
59

15 .7854
[illegible]
8) [illegible] (9.5 [illegible] in
[illegible]
14

15/10 C.cc (20, X the quantity necessary for 10

1 2.25 [illegible] 2) 20 (10 X say 15 X for [illegible]

[illegible]
60
[illegible] g ZnO 15 cc H_3PO_4

12
4
20
4
60 cc H_2O

I tried one 21 g ZnO + 12 cc U.S.P. Phosphoric + 4 cc H_2O [illegible] grammes [illegible]

In varying the proportions from 20, 12, 4 [illegible] the least bit. The [illegible]

I tried [illegible] Phosphoric acid [illegible] in various proportions [illegible] air [illegible] [illegible] pure [illegible] [illegible]. It [illegible] the maximum [illegible] set in and at [illegible]

Other [illegible] [illegible]

[illegible] tried 20, 11, 6. [illegible] soft [illegible]

20 ½ g Zn Oxide + 12 [illegible] U.S.P. [illegible] Phosphoric [illegible] [illegible] acid. [illegible] 5 minutes and [illegible] [illegible] Zinc Oxide + Phosphoric Acid [illegible]

Yellow & Mag. Analine Sol in H_2O

Greens

Green P.
Acid Green C.G.X.
" " B.B.X
Green M.
Naphthol Green B

Blues

Fast Blue
Cotton Blue S.B.X Conc.
Naphthol Blue L.S Conc
Victoria Blue A.R.
Blue R.R.

Aquino
Pat. Blue
Methyl Blue B.B.
Pat. Blue A Conc.
Methyl Blue S.B.X
Fl— Blue B.H.X.
Blue B.B

Violets

Methyl Violet 3 B.B.
Violet 6 B. Crystl
Acid Violet 4 B.I.M. Conc.

Reds including Crazy

Safranine Base
Chrysoidine R.
Rhodamine R.X.
" Base
Rhodamine B.X.
Fuchsine R.T.
Croc. Scarlet M.O.O.
Croc. Orange # C 2544
Acid Magenta
Benzo Purpurine 4.B. Conc
Orange 2.R.
Scarlet 2 R.N.
Amaranth B. Conc.
Scarlet Brill 4.R.
Orange Y.
Safranine G.F.F.X.

Yellows & Browns

Auramine O.O.B Conc
" O. Base
Phosphine I. Tinder.
Bis. Brown 2 R.X.
Resorcine Brown O.B.
Nankeing Yellow Y.
Phenol Brown E.T.
Nankeing Yellow R.
Phenol Brown A.T. Conc.

Chin. Yellow W Conc
Resorcine Brown L.X.
Bis, Brown Y Brill.
Fast Yellow # 95
Chrysoidine Y.
Phosphine Y.Y.

Blacks

Prazo Black K.D.X Conc
Nigrosine R.
Nigrosine B.B.

Backing for Records (Continued)

10 g Mg O Dell Burnt
10 cc 70% Magnesium Chloride
The remainder [illegible]
[illegible] too brittle

10 g Mg O
10 cc 70% Mg Cl
10 g Pumice
[illegible] not
soluble.

Rosin Soap.

100 cc of a solution of Washing Soda ($Na_2CO_3 \cdot 10H_2O$) Sp. G. 1155 @ 30° C ($Na_2CO_3 \cdot 10H_2O$) or 14.2 % Na_2CO_3 about 50 g. Washing Soda in 100 cc Water is put into a container into the steam bath to this is added 50 g. Powdered Rosin and measuring Spoon until 1/3 the water has boiled off then put on the steam bath under slow stirring until a drop on a piece of glass looks fairly clear and brown little milky. This takes about 2½ to 3 hours.

Let cool and then wash with water adding the water gradually keeping the mixture stirred. At one point it becomes white but this disappears when more water is added. The quantity of water to be added can be varied to suit the purpose for which it is to be used.

Best Rosin Used

This gives 946 cc in Solution of Sp. G. @

946) 3785 (4.
3784

so 4X

1155 Sp. G. Na_2CO_3 Sol. = 14.5 % Na_2CO_3

108 — 80 :: 14.5 : X

$\frac{80 \times 14.5}{108}$ = 10.74 % NaOH Sol. required to equal the alkalinity of the carbonate Sol.

10.74 % NaOH = 1122 Sp. G. @ 15° C = 1.1250 @ 30° C

50 g in 100 cc water gives 125 cc Solution

Sp. G. @ 15° C = 1165 = 40 % NaOH

$Na_2CO_3 \cdot 10H_2O$ or 14.2 % Na_2CO_3

40 g NaOH × 4 = 160 g Washing Soda

50 g. Rosin × 4 200 g Rosin

will make 3785 cc or 1 gal Sol.

$\frac{453}{200}$ = .225 lb Rosin $\frac{453}{160}$ = .281 lb Soda

1 gal requires 0.281 lbs Washing Soda

1 " " 0.225 lbs Rosin

Washing Soda @ .03 per lb. = .0084 Soda

Rosin Best. @ .03 per lb = .0077 Rosin

.0161 cents per Gal.

Say .02¢ per Gal.

280 lbs rosin @ $7.00

The $Na_2CO_3 \cdot 10H_2O$ Sol. made by dissolving 40g carbonate up to 100 cc with water Sp. G. 1.165 @ 15°C

theoretically should give 286 — 80 or
40 — X

$\frac{40 \times 80}{286} = 11.2$ g NaOH in 100 cc Sol or 11.2%

NaOH
by titration I found

75.5
5.6
69.9
0205
3495
1398.0
14.329 5 grams

or 14.3% NaOH.

Titrating 5 cc of the Na_2CO_3 Soap
I found

1.2
0
1.2 cc

1.2
.0205
60
240
.02460
20
.049200 g excess alkalinity in 100 cc
9.5 950 cc
246000
142800
.467400 0 g too much Na_2CO_3 as NaOH

286 — 80
X — .467 = $\frac{.467 \times 286}{80}$ =

286
.467
2002
1716
1144
133.562

80) 133.562 (1.67 g Desired Soda
80
535
480
556
560

14.329 g NaOH in 100 cc
.467 excess in 100 cc
13.862 g NaOH in 100 cc or

.1162
1.152 = 14.37
.010 = 13.55
.82

.82) .01.000 (.0012

for each .1 in %

1386
1355
.31

.0012
.31
0012
0036
00372

1152
0037
11557 Sp. G. @ 15% NaOH

1 50 cc of 10 % NaOH is heated just to boiling then 30 g crude resin added and left to the boiling point until all the resin is thoroughly melted, then boiled 15 minutes, then 50 cc more water added and boiled for another 15 min.

This makes 630 cc of 1.025 Sp. Gr. Sol.

2 same as above except heated on the steam bath and not boiled for about 3½ hours.

630 cc of 1.025 Sp. Gr. Sol.

3

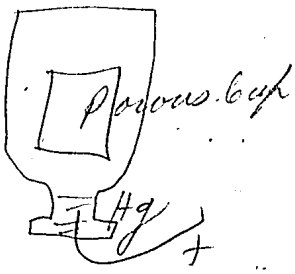
Mercuric Oxide Sept. 4/13

Reported on the following.

Made Two 5 lb. Batches of Filler for Discs
" 4 15 lb. " " " " "
" 2 2000 g. Batches of Benzine
" One Batch sol. for [illegible] powder Discs
" 8 Batches of Stannous Chloride
400 Bassett Lovely Black and
8000 more grams Benzine.

Tried Conc. Sol of Na_2CO_3
" 10 % " " " "
" Conc. " " $NaHCO_3$
" 10 % " " " "
" Conc. " " KNO_3
" 10 % " " " "
" Conc " " Na_2SO_4
" 10 % " " " "
" Conc " " K_2SO_4
" 10 % " " " "

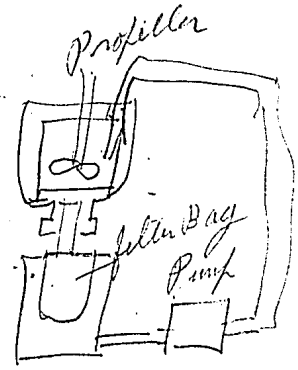
These were electrolyzed on the following apparatus, both dissolved in Hydrate and with the addition of a little acid about 2 %



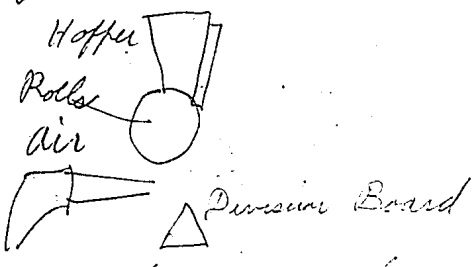
Both porous cup and jar were filled with the above solutions and electrolyzed at various current densities.

In all cases I found the solution in the porous cup became alkaline NaOH and KOH respectively but no HgO In all cases I found to sediment on the bottom of the jar which I filtered off washed out with water and tested to see if it contained the corresponding acid this I found to be the case, showing the formation of mercuric base [illegible]

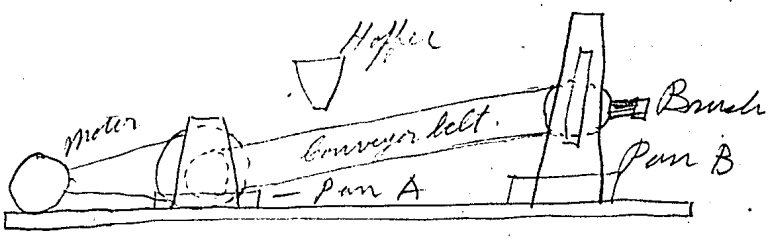
The following methods have been tried to separate the Hg from the HgO but were found to be W.G.
Sp. G of HgO = 11.1 and Hg = 13.00



The heavy particles of HgO could be separated from the [illegible] while microscopic particles of Hg back over with the most light particles at [illegible] of the [illegible]



In this case much more was used and the [illegible] [illegible]



Here the mercury oxide was let through the hopper and allowed to fall on the conveyor belt. The mercury (metallic) having a tendency to roll fell back into pan A while the oxide was carried up the conveyor and brushed off into the pan B. This made a good separation but not perfect as yet.

Volatilization determination of mercuric oxide. Alumina is for use in disc record in combination with the Phenol-formaldehyde resin. 10 g used in each case. Allowance [illegible] for loss

Acetanilid

Weight of disk 18.5342

Total 28.5342

28.5342
23.6532
4.8810 Loss

Alpha Naphthol

28.5342
21.6532
6.6532 loss.

Zebra Monochrome

28.5342
25.0360
3.4982

Para Phenylenediamine

Heat [illegible] on the boat
Can see it condense in liquid form on edge of dish

Paraphenylenediamine

28.5342
24.3641
4.1701 Loss

A great deal collected on the edge of the dish and was counted as not lost.

Iodine sulphur chloride (hard)
Boils at less than 140° Gases
fumes not Total Loss 5g.

Acid Salicylic 23.5342
21.3520
2.1822 loss

Acid Salicylic Sublimes too easily

Picric Acid 28.5342
22.8800
5.7032 loss

Phtalic Acid same as Salicylic

Perchlor benzole

Acid Green COX. Does not melt at 350.
just softens,
29.7967
28.6770
1.1190 loss

Rhodamine B.X.

Beta Naphtol

Safranine Base

Hexachlorethan Sublimes 300 off gas
in about 20 minutes at 340

Comparison of properties of Cresol & Phenol Resin under the influence of heat.

	Phenol	Cresol
Softened like molasses in winter	210	217
Barely melted like stiff molasses	220	225
Melted like syrup.	270	
Evolution of gas in the middle (start)	275	230
More Rapid evolution of gas	355	260
Nearly clear	385	360
Clear	400	370
Just gets a little cloudy	420	
Skin forms on surface	450	500
Evolution of gas commences again	460	530
Quite a little foaming	500	550
Fumes very much	520	550
Most Liquid	560	560
Cresol forms practically no skin		

Rosin Soap

Tolu	90,00	gram		
Kokosnuss Öl	45,00	"		
NaOH 30° Be	16,50	"	1,265	28,0
KOH 30° Be	13,50	"	1,263	28,0
Öl Bergamott	1,2			
Öl Lemmis	1,0			
Öl Rosmarin	1,21			
Öl Lavender	1,21			

Ein Tropfen Karbol genügt.

Stannous Chloride Sol

For 2 gals 130 g $SnCl_2$ + 20 cc HCl + 2 gals H_2O added gradually Filter —

For 1 bottle 50 g for 3000 cc H_2O

Paste

Recipe for Film Gum paste —

a

1 lb. Brown Sugar bis. — 8 oz. H_2O.

b.

1/4 oz. Gelatin
2 oz. H_2O

c

Corn Starch 6 oz
H_2O 6 "

pour in 16 oz. Boiling H_2O.

(Kohle) entfernen von Gas Motoren
4 Vol. Petrol
1 Vol. Acetone

Methode Glas Lampen zu Färben
Man löst 6 unzen Löslich Brunnöle in einer Gallone Amyl Acetat und gibt dazu ein Alkohol löslich Anilin.

Methode für Messing schwartz zu Machen

Ammoniak 26%	1 gal.
Kupfer Kornbonat Trocken	1/2 Pfund
Natron Kornbonat (Krystl.)	1/2 "
Warm Wasser	1/2 Gal.

Kupfer und Ammoniak zusammen Mischen Natron und Wasser
Gegenstände müssen in Säuren oder auf andern Wege gesäubert werden
Kupfer und dann ein Natron Hydroxyd bad zum Last zu halten die schwartzen nun zusammen.

Metall zu Schwartzen

Bismuth Chloride	1
Quicksilber Bi Chlorid	2
Kupfer Chlorid	1
Öl	6
Alkohol	5
H_2O	50

NG

Beitz für Glas

Amonia Hydrofluoric	30
Agua	15
Acidi Hydrofluoric Fumantis	15
Acidi Sulphuri	15

Imitation Mattes Stoff

1	Gumme Sandarac	18	9
2	" Mastic	4	2
3	Ether Sulphuric	250	100
4	Benzolum	80–100	40–50
3	— — — —	27.8 ccm	
4		92 ÷ 115	

Silber zu Schwartzen

Ammoniak 26%	37.5 c.c.
Kohlensaures Kupfer	4.5 g
" Natron	4.5 g
Wasser	37.5 c.c.

Man löst das Kupfer Salz in Ammoniak dazu das Natron Salz dann das Wasser

Schwartz Kupfer

Nitrat Natron + Natron Sulphat 1%
Lauge auf kochendem wasser.

185

KCN Filtrier Lösung (Pneumolin)

2234 cc Paraffin

96 grm Lysol Kalium

KOH Lösung 3 Teile 33% KOK + 77 Teile H_2O

2156 H_2O 84 33% KOH

$(NH_4(OH)$ 9.4%

= 734 cc 29.4% Ammonia and 1.666 cc H_2O

Index –

New Cell. (Cement Copper & Zinc dust Pages 1—2
White Cement Pages 3—
Charging Storage Batteries from the Air Pages 4—
Titration of Samples of Electrolyte 6—8
Experiment on Electrolytic Metallic Iron 9-10-12-14
Löwen Fuchsin Lösung 11

Experiment upon rectifying power of Tungsten Bronzes 17—19
" " stiffening of cement for Cabinets 35
Solubility of Bi Salts in Li OH + KOH 20—21
Difficulty with Nickel Hydroxide 22—23
Exp. making Metallic iron from Fe Hg Alloy — 27-34/61-62
Experiment on Ni OH. Bag Experiment 39—44
" " Phono Cabinet (Plaster) 45—46
" " Plating Ni Flake 48—53
Sol for removing ~~Copper~~ Glue from Masters (Formula) 55
Report of I.A.E. on Cu Ni Plating 65—66
Exp. on Heavy Nickel Plating 70—77
Fusable Alloys 78—79
Exp. on Record Material 81
Exp. on coloring Plaster Parts 83—84
Sol. to coat inside of B. Ardsel Records 85/95—98
Dielectrics for Spiders used on Disc Records 86—94
Formul für Fill Material für Flow in Magnet
Experiment to Plate upon wax by means of various Bronzes as a conductor 100—106

1135 33% KOH
865 cc H_2O
2000 cc 27% KOH

H_2SO_4 Sp. G. 1250
2000 cc H_2O + 600 cc 98% C.P.